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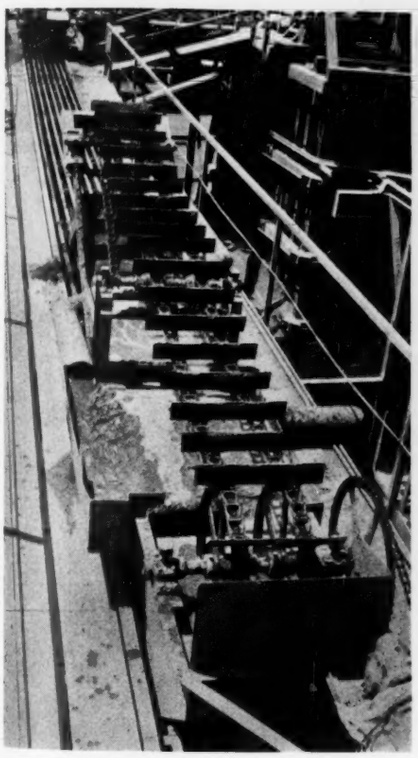
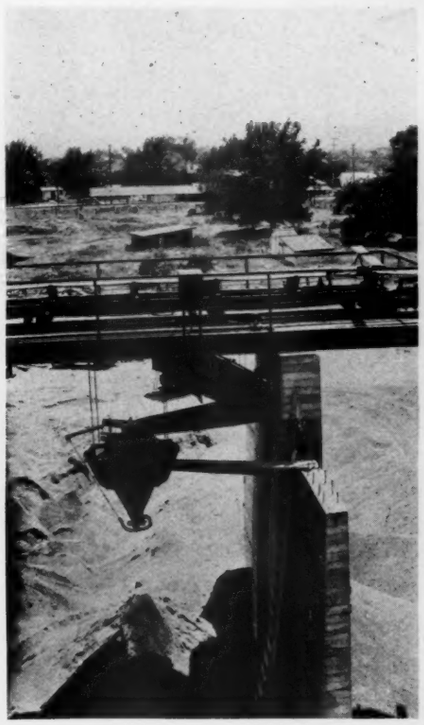
MODERNIZATION GRAPHICALLY SHOWN

SCENES shown here provide an illustrative preface to the description of plant improvement published on the following pages. Operating details of these representative installations, as given in the story, indicate the high degree of classification of the carefully worked out program in the Basalt Rock Co. plant at Healdsburg, Calif. The four rows of spray nozzle washers (right) adapted to the gravel vibrating screen reflect the thoroughgoing character of processing operations in this large plant.

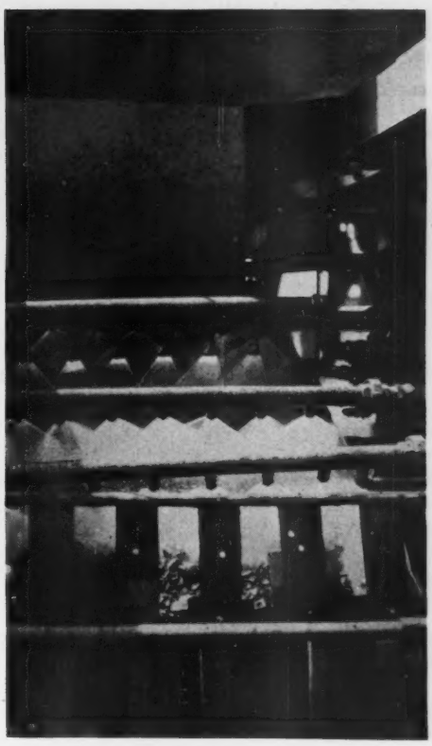


Fine sand classifier equipment



Vibrating screen and sand cone for plaster sand production

efficiency, etc., attainable with modern methods and apparatus. For example, the Link Belt fine sand classifier (left) effects with ease a product testing 90% minus 30-mesh, and 65% minus 50-mesh. The vibrating screen-sand cone application also is typical



Nozzle washers over vibrating screen

Below: Car loading arrangement at plant of Basalt Rock Co., Healdsburg, Calif. Main loading conveyor runs from tunnel, and discharges to loading belt over vibrating screen for final rinse and removal of undersize

Basalt Rock Co.'s Sand and Gravel Plant at Healdsburg, Calif.

By Ernest Moyer
Alturas, Calif.

THE large number of cities and towns and industries bordering on San Francisco Bay and San Pablo Bay in California combine to make a large market for sand and gravel and crushed stone. Although there are deposits nearby, large deposits of easily-worked, high-quality material are not over-plentiful.

However, a little further away, at Healdsburg on the Russian river to the north, is a deposit outstanding both as to size and quality. This was formerly worked by the Russian River Sand and Gravel Co. and is now owned and operated by the Basalt Rock Co., Inc., Napa, Calif.

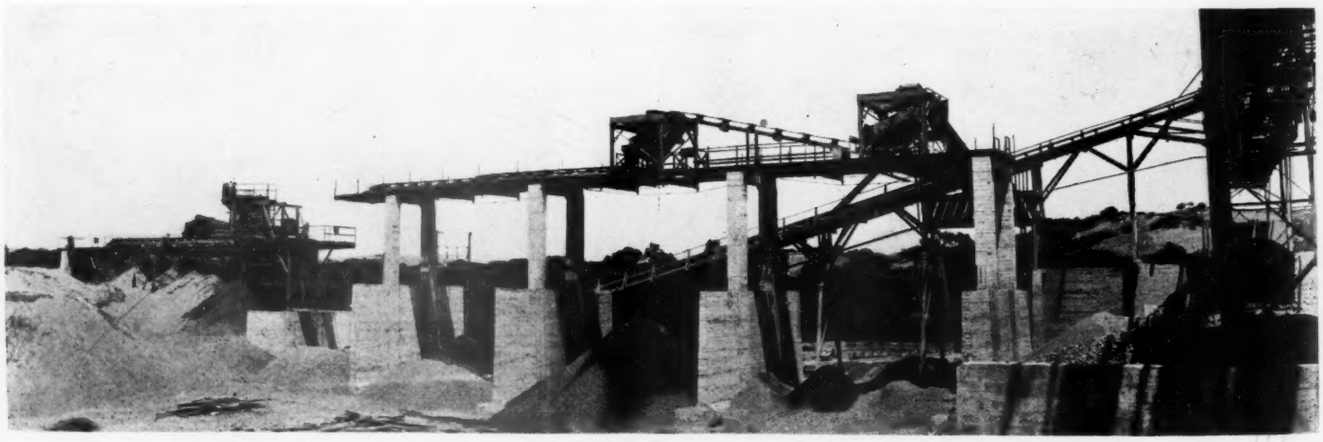
The Russian river has its source in the mountains to the north and flows much of the way through steep, rocky canyons carrying masses of rock and soil, loosened by the heavy winter rains. The extinct volcano, Mt. St. Helena, the Sonoma and Calistoga geysers, the petrified forest and numerous hot springs are all within or only a few miles distant from this watershed. At Healdsburg the river describes a great bend, and from here flows westerly to the Pacific. Just upstream from the bend is a deep, narrow gorge, and the flood waters, tumbling and scouring their burden of sand and gravel, finally deposit it in the bend and over the flood lands on the inside of the bend. This flood area and some of the gorge constitutes the Basalt Rock Co.'s holdings.

Tests to a depth of 35 ft. indicated no change in the nature of the deposit. This large yardage, along with the seasonal replenishment, would seem to insure a practically inexhaustable supply of material. The cleanliness of the deposit is remarkable, requiring only a series of rinsings, instead of the customary washing and scrubbing. As to quality, the material easily passes the most rigid tests. In size, it ranges from 6-in. boulders down to sand in proper porportion, although there is a slight excess of 1¼- and 1½-in. gravel.

Shuttle conveyor at left, adjoining surge bunker, and main conveyor A at right

The material is excavated crosswise of the channel, using a locally built 5-yd. drag scraper. This discharges through an opening in the roof of a concrete tunnel to a hopper from which the material is fed to a belt conveyor.

Unit crane for rehandling at Healdsburg plant. Gantry supported conveyor increases sand storage capacity



Sand storage at left, crushed gravel at center, and uncrushed gravel storage at right

Reclaiming conveyor at left, discharging to rinsing screen and car loading conveyor at right

The hoist operating the scraper is gear driven by a 125-hp. 2300-volt Westinghouse motor. Air-operated frictions are used, the air being supplied by a small compressor which is gear driven from the hoist countershaft. This hoist, as well as the head and tail blocks, was furnished by the Washington Iron Works, Seattle, Wash. Roebling 1⅛-in. wire rope is used and the operating distance is up to a maximum of 1200 ft.

From the hopper the material is fed by a 20- by 48-in. reciprocating plate feeder to a 24-in. by 465-ft. inclined belt conveyor carrying up to the plant.

Two mobile excavating units are used to supplement the drag scraper during the dry season. A Northwest 1¼-yd. dragline is used out on the gravel bar, depositing excavated material in a small bunker from which it is hauled about 200 yd. by two 2½-yd. Ford dump trucks. These trucks discharge into a hopper above the main conveyor. Use of this equipment has stepped up plant production by 100 tons per hour.

Ford trucks likewise haul the fine dry sand, dumping it into the hopper above the main conveyor belt.

The second mobile unit is a ⅜-yd. Byers shovel operating in a dry pit of fine sand. The sand of the Russian river is naturally a rather coarse sand. The Basalt Rock Co. found that by adding fine bank sand to the feed entering the plant and washing and grading the fine sand, they are able to furnish sand of high strength and workability and of any fineness modulus.

Scalping

The main conveyor discharges to a 4- by 10-ft. double-deck Niagara vibrating screen located above a surge bunker. The first 5 ft. of the top deck is of extra heavy ¾-in. mesh manganese crimped wire to withstand the discharge impact and limit the size of the throughs to the first section of the lower deck. The remaining 5 ft. of the top deck is 2½ mesh. The plus 2½-in. material from the end of the top deck falls to the front compartment of the surge bunker.

The lower deck has ¼-in. mesh wire cloth and the ¼-in. by 2½-in. material over the end of the lower deck falls to the rear compartment of the bunker. The minus ¼-in. material passing through the lower deck is flumed to a Bodinson two-gang, rake type classifier located alongside the bunker and above the sand storage.

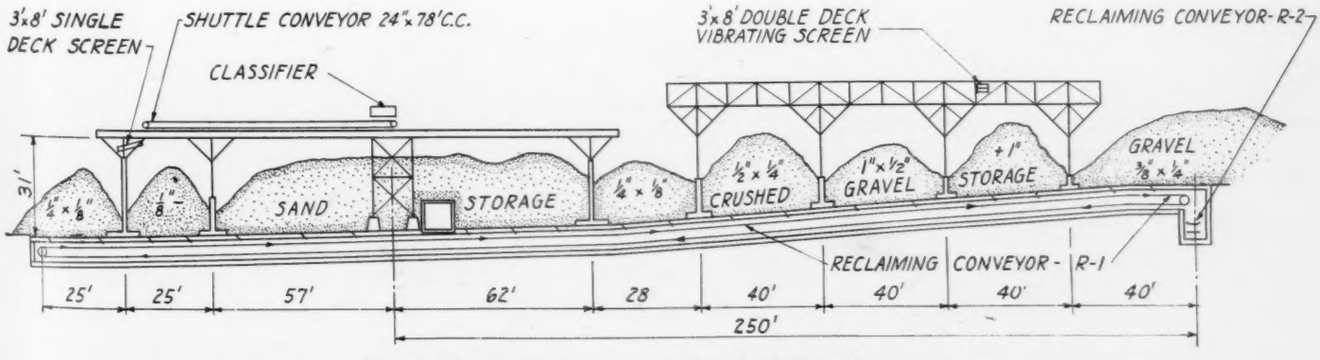
The first of the series of rinsings, with clear water at 30 lb. nozzle pressure, begins at the top deck of the scalping screens. Four 2-in. pipes, above and across the screen, are fitted with spray nozzles such as are used for road oiling. A third pipe, similarly fitted with nozzles, is placed and locked in holes through the screen side plates just above and near the lower end of the bottom deck. These nozzles are set about 45 deg. against the material flow. This pipe, of course, vibrates with the screen, and because of this is connected to the supply by a section of flexible high pressure hose. This layout of jets insures that every particle of minus ¼-in. is washed out of the aggregate.

Sand Storage

Alongside the bunker is a 24-in. by 78-ft. reversible shuttle conveyor supported on a steel structure above the sand storage area and moved by means of ropes and a winch head on the conveyor head shaft. The classifier discharges directly to the pile below until it has been built up to the maximum height and the pile is then extended by means of the shuttle conveyor.

Also a gantry supported conveyor opposite the Bodinson classifier, and at right angles to main steel structure over the sand storage, materially increases the sand storage capacity.

At one end of the storage a 3-ft. by 8-ft. Niagara screen with ⅛-in. mesh wire cloth is mounted so that the sand may be run over it. This produces two sizes, "birdseye," or ¼- by ⅛-in., at the end and plaster sand



Sectional elevation of sand and crushed gravel storages

or minus ⅛-in. in the next pile. The sand grades about right most of the time, but is checked by test screens and if necessary is piled separately by the shuttle conveyor and recombined in the desired proportions when fed to the reclaiming conveyor.

Sprays have been installed over the 3x8 ft. Niagara screen, and the plaster sand is dewatered by means of an Allen cone.

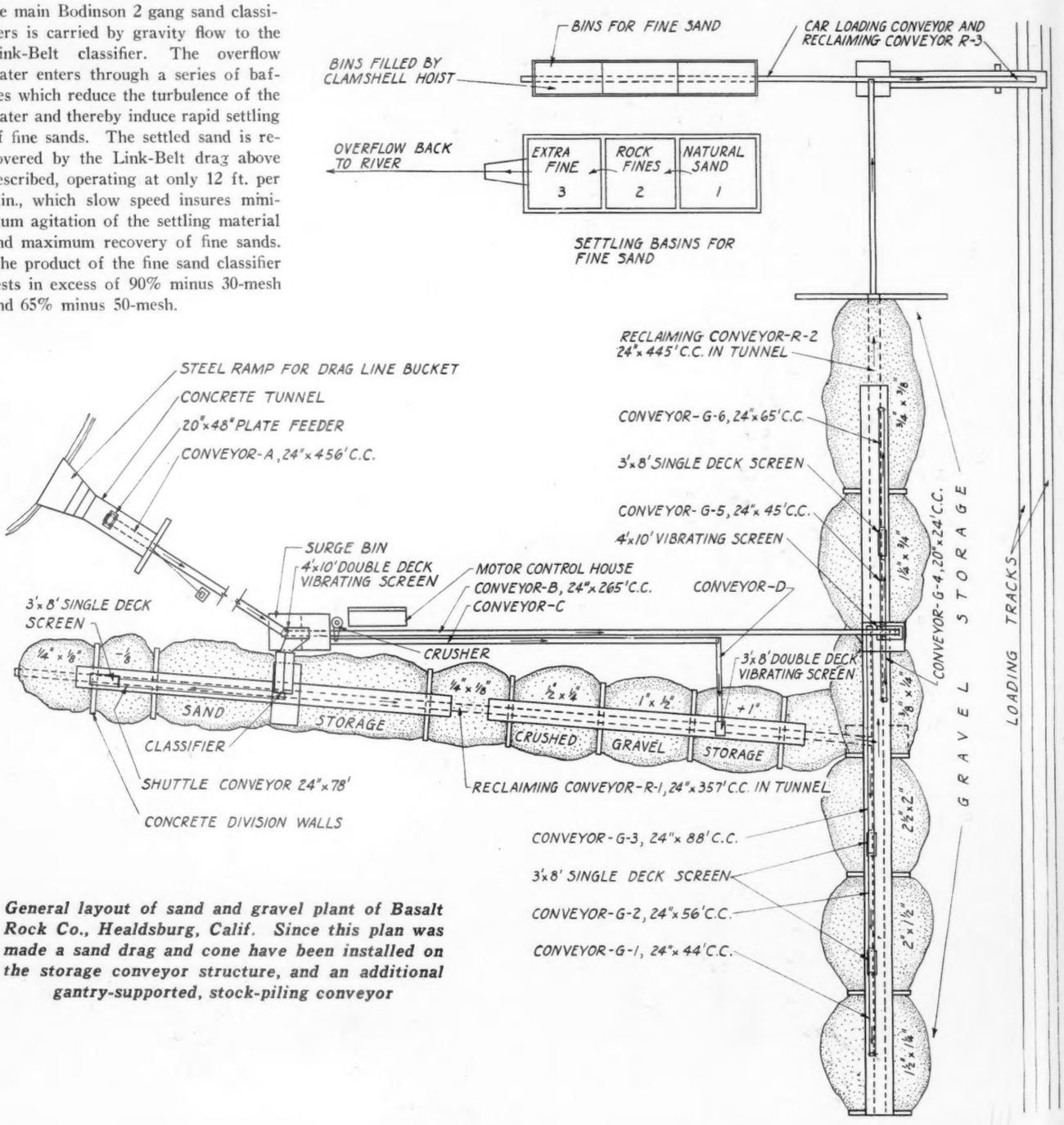
Fine Sand Recovery and Storage

Two systems are in use for the recovery of fine sands carried off by the classifier overflow. First, on one end of the steel superstructure carrying the sand shuttle conveyor, a Link-Belt, continuous type, drag classifier has been installed. Overflow from the main Bodinson 2 gang sand classifiers is carried by gravity flow to the Link-Belt classifier. The overflow water enters through a series of baffles which reduce the turbulence of the water and thereby induce rapid settling of fine sands. The settled sand is recovered by the Link-Belt drag above described, operating at only 12 ft. per min., which slow speed insures minimum agitation of the settling material and maximum recovery of fine sands. The product of the fine sand classifier tests in excess of 90% minus 30-mesh and 65% minus 50-mesh.

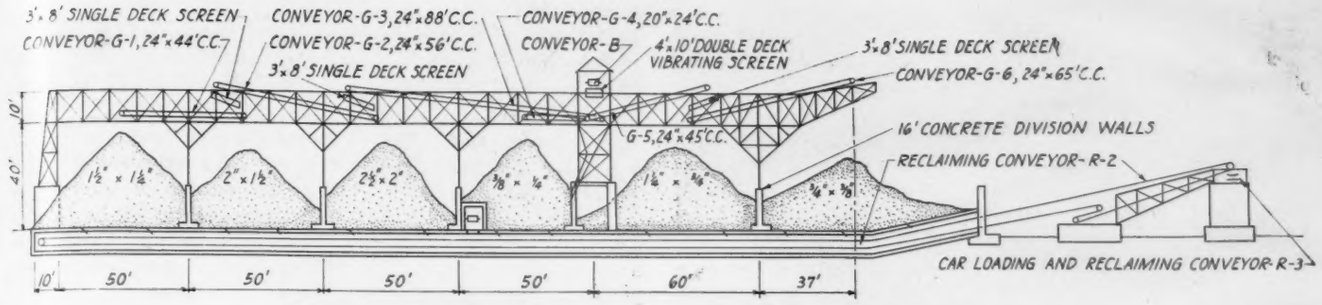
The fine sand is stored above the reclaiming conveyor (R1) so that any desired amount can be added to the regular concrete sand.

The second method of fine sand recovery is operated in conjunction with the fine sand classifier, or when the fine sand storage above the reclaiming conveyor is full, is used alone. On low ground, between the plant and the river, settling basins have been excavated. Wash water from the entire plant is flumed to the upper end of these basins. The first basin receives the sand classifier overflow, also all rinsings from the gravel storage section if the crusher product is routed on to conveyor C. The contents of this basin are "true" fine sands. Recovery is made by means of excavation with the Unit crawler crane and Owen clamshell bucket, which discharges into circular steel storage bunker over carloading-reclaiming conveyor R3. Any desired fineness of sand can be secured as, naturally, the coarser sand settles nearest the point where the wash water enters the basin and growing finer toward the farther end of the basin.

A second settling basin is used for the recovery of crusher fines secured when the



General layout of sand and gravel plant of Basalt Rock Co., Healdsburg, Calif. Since this plan was made a sand drag and cone have been installed on the storage conveyor structure, and an additional gantry-supported, stock-piling conveyor



Sectional elevation of gravel screening and storing arrangements

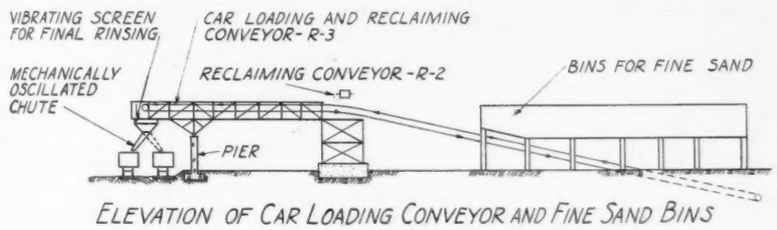
crushed product is routed over conveyor B. These fines are in demand for adding to the washed crushed gravel for the production of self-cementing road rock.

Gravel Crushing and Storage

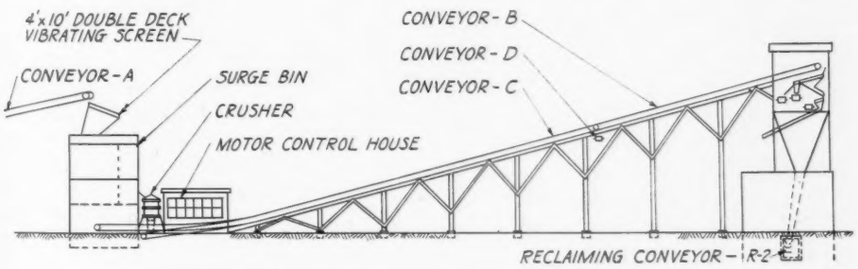
The ¼- by 2½-in. gravel in the rear compartment is fed to Conveyor B and goes to the gravel sizing and storage section of the plant. The plus 2½-in. material in the front compartment is fed by means of a gate and chute to a No. 37 new style TZ Traylor reduction crusher which is Texrope driven by a 50-hp. Westinghouse motor.

From the crusher the material may be fed to Conveyor C or mixed with the uncrushed gravel carried by Conveyor B. Conveyor C, carrying crushed gravel only, discharges to a cross conveyor, D, which in turn discharges to a 3- by 8-ft. double-deck Niagara vibrating screen. This screen has 1-in. mesh wire cloth above and ⅛-in. mesh below and is equipped with sprays.

The plus 1-in. material passing over the top deck, approximately the 15% above the 1-in. crusher setting, falls to a stockpile below, while the ⅛- by 1-in. sizes passing over the lower deck are conveyed, sized and stockpiled in a manner similar to the handling of the uncrushed gravel, described further on. The minus ⅛-in. material is flumed to the second sand recovery compartment.



ELEVATION OF CAR LOADING CONVEYOR AND FINE SAND BINS



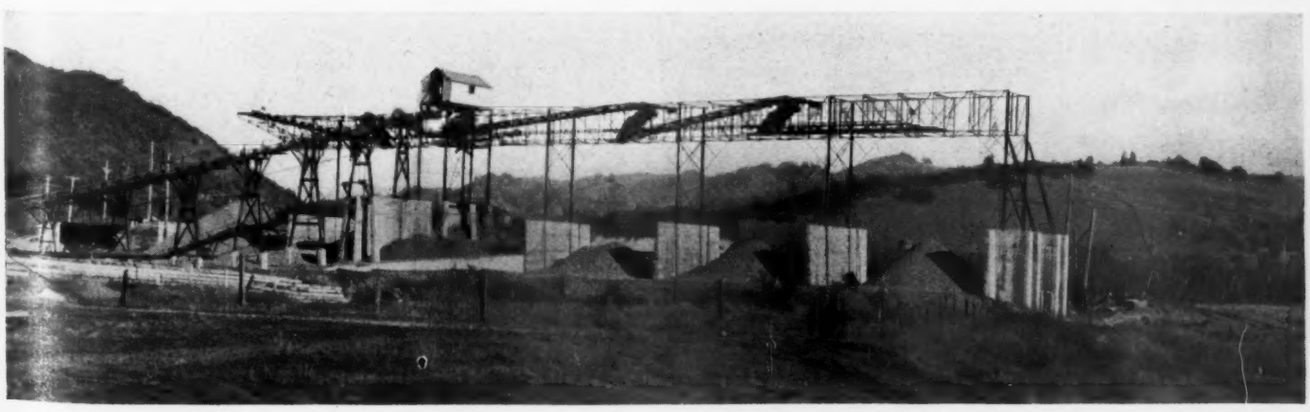
ELEVATION OF SURGE BIN AND CONVEYORS-B AND C

Elevations of car loader and surge bin

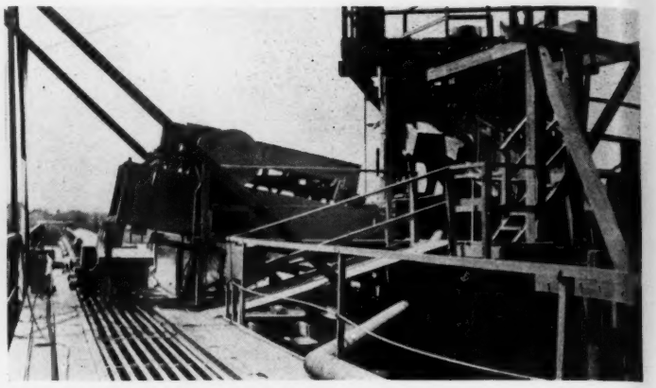
Gravel Sizing and Storage

The main gravel storage is at the end of Conveyor B and at right angles to it. Open storage piles are formed by discharging the various sizes from screens or conveyors located in a steel structure extending along above the piles. The steel structure is supported on reinforced concrete division walls separating the different sizes. Six conveyors and four vibrating screens are used for sizing and piling the gravel sizes, as shown in one of the illustrations.

Conveyor B, carrying ¼- by 2½-in. gravel from the surge bunker, discharges to a 4- by 10-ft. double-deck Niagara vibrating screen located on the structure above the stockpiles. This screen has 1¼-in. mesh cloth above and ⅜-in. mesh below. The 1¼- by 2½-in. gravel passing over the top deck is carried toward one end and sized and stockpiled by a series of three 24-in. belt conveyors and two 3- by 8-ft. single-deck vibrating screens. It will be noted that the large sizes are rejected first and fall direct from the screens to the piles, 2- by 2½-in. first, then 1½- by 2-in., and last, from the end conveyor, 1¼- by 1½-in. The throughs feed



Gravel screening and storing arrangements



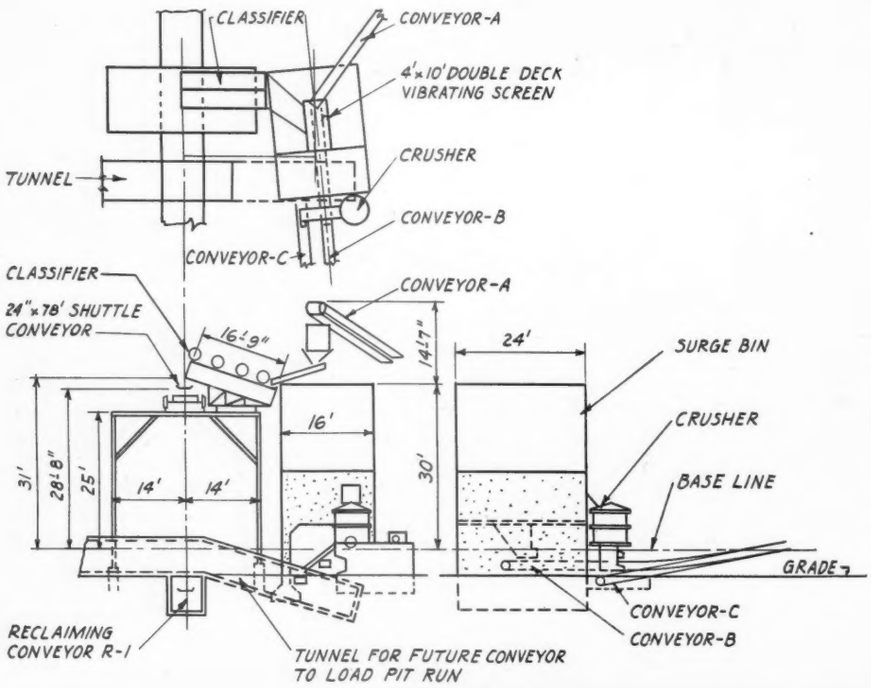
Two views of sand classifier and shuttle conveyor, also sand drags.

on to the conveyors and move to the next smaller mesh screen, where the process is repeated. By recombining, the sizes can be accurately proportioned to comply with the most exacting specifications.

The ⅜- by 1¼-in. material passing over the lower deck of the 4- by 10-ft. screen is carried toward the opposite end of the storage and is sized and stockpiled by two conveyors and one 3- by 8-ft. single-deck vibrating screen. Two additional sizes, ¾- by 1¼-in. and ⅜- by ¾-in., are piled at this end of the storage.

The 4- by 10-ft. screen is equipped with sprays and the gravel is again rinsed at this point. The minus ⅜-in. material passing through the lower deck is flumed to a 2- by 3-ft. vibrating screen below (⅛-in. mesh cloth), where the fines are separated from the small gravel, the ⅛- by ⅜-in. material being stockpiled by a short 20-in. conveyor and the minus ⅛-in. material and water flumed to the settling basins.

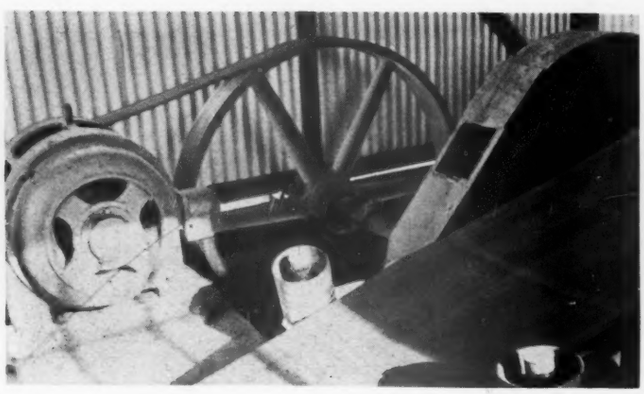
If the crusher product is routed on Conveyor B, minus ⅛-in. rock dust is flumed from the 2- by 3-ft. screen; if it is routed on Conveyor C, the rinse water from the screen is practically clean. Rigid precautions are taken that there shall be no contamination of the stockpiled material from the 4- by 10-ft. and 2- by 3-ft. screens and their respective distribution chutes. Built directly underneath to catch any spill is a small bunker or hopper, with its discharge gate over the reclaiming conveyor. Obviously, the contents of this hopper would always be excellent concrete material. Also, the motor controls are so interlocked that if there is any failure of stockpiling or screen motors, Conveyor B is automatically stopped. The same interlocking arrangement is used also on the crushed gravel section.

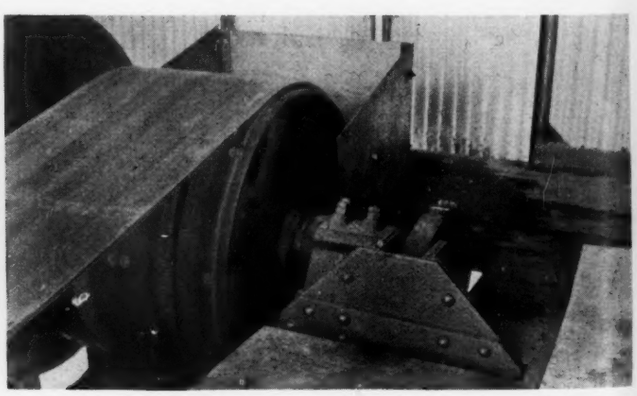


Above: Details of surge bin

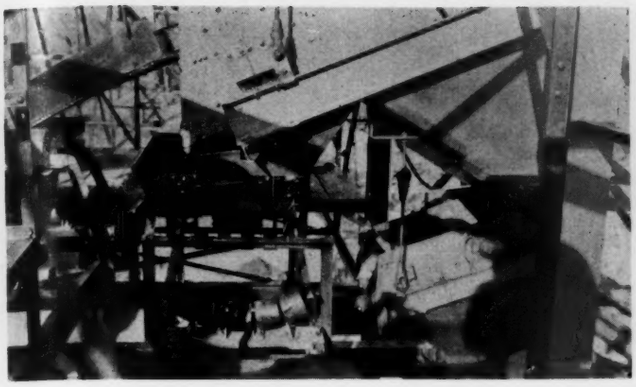
Reclaiming and Shipping

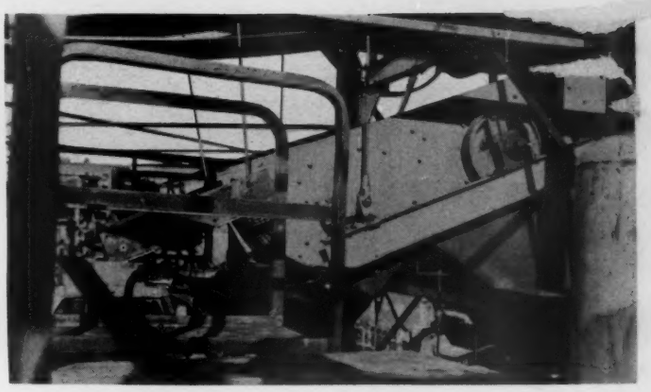
The stored material is reclaimed by means





Two views of conveyor B drive showing V-belt drive and non-reversing ratchet on head shaft





Two views of 4- by 10-ft. double deck vibrating screen over gravel storage

of belt conveyors in concrete tunnels below the piles. Conveyor R1 (24 in. wide by 357 ft. long) below the sand and crushed gravel storages discharges to Conveyor R2 (24 in. wide by 445 ft. long) below the main gravel storage.

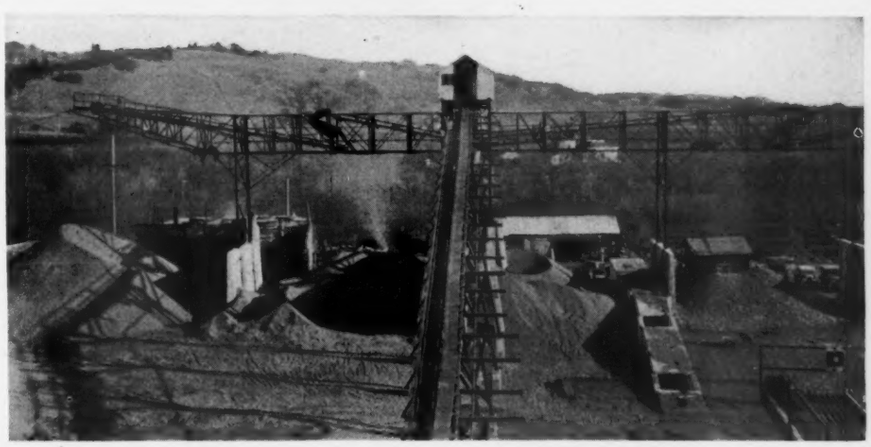
Conveyor R2 in turn discharges to Conveyor R3, which feeds a car loading chute. This chute is mechanically oscillated to prevent segregation of sizes. A fine mesh vibrating screen is to be installed between Conveyor R3 and the car loading chute to give a final rinsing to the material as it is being loaded. Conveyor R3 is also to be extended out under the fine sand bunkers.

Material from the piles is fed to the reclaiming conveyors by hinged chutes that in the raised position shut off the feed. In the lowered position sufficient clearance is provided to not interfere with the material already on the belt. Graduated controls set the chutes to feed the amounts required, either for straight sizes or for the recombining of almost any combination of sizes. The total capacity of the open storage is estimated at around 50,000 tons.

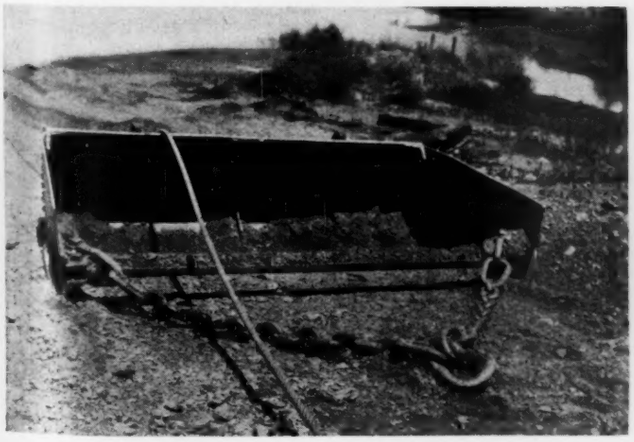
General

All screens are of the Niagara vibrating type. Practically all conveying and transmission equipment was furnished by the Bodinson Manufacturing Co. Pacific Gear

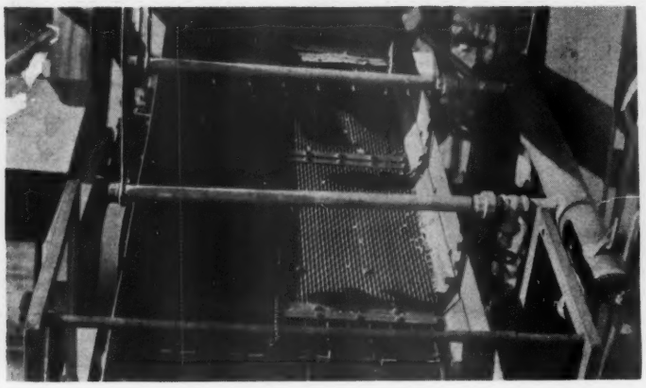
Side view of shuttle conveyor and sand storage

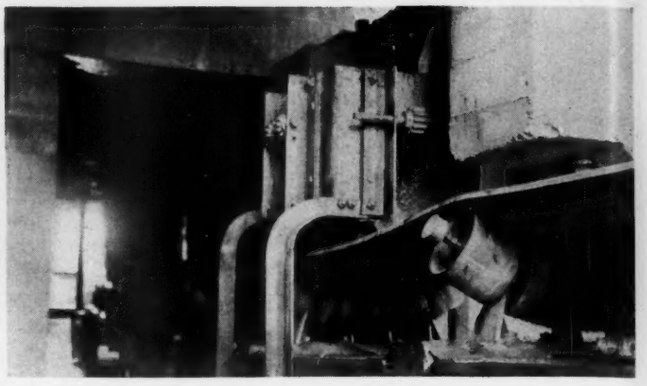


Looking up conveyor B toward gravel storage



Drag scraper of 5-yd. capacity at left and water pump at right





Double deck vibrating screen which takes material from conveyor A, at left, and feed end of conveyor B, at right

and Tool Works speed reducers are used on the conveyor drives, with Texrope drive from the motor to the high-speed shaft of the reducer and roller chain from the low-speed shaft to the conveyor head shaft. The chain drives are in welded steel housings and run in oil. The motors, V-belt drives and reducers are also protected by welded steel covers.

All new motors are Fairbanks-Morse.

Cone classifier making plaster sand

Rubber belting of the highest quality made by each of several manufacturers was used throughout on the conveyors. The motor controls are centralized at a point near the surge bunker from which practically the entire plant is visible. Purchased electric power at 11,000 volts is stepped down to 2300 volts for the hoist motor and to 440 volts for all other motors.

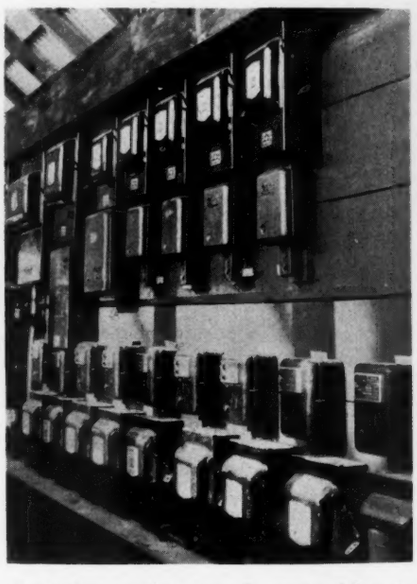
Water for washing is furnished by a 1000-g.p.m. 6-in. Fairbanks-Morse centrifugal pump unit. In the piping layout few fittings were used, most of the branches and bends being formed by oxyacetylene welding.

In addition to the Unit crane and ½-yd. Owen clamshell bucket, a "30" Caterpillar fitted with a McMillan bulldozer, and several Barber-Greene portable conveyors, are used for moving and rehandling material.

Trucks are loaded from bunkers which are filled by the reclaiming conveyors. The plant is located in a fruit section near the Redwood highway, so that there is considerable local truck delivery, although most of the output is shipped by rail and goes into the Bay area. The Northwestern Pacific railway passes the plant and serves territory to the north and south to the Bay and connects a few miles south with the Southern Pacific railway.

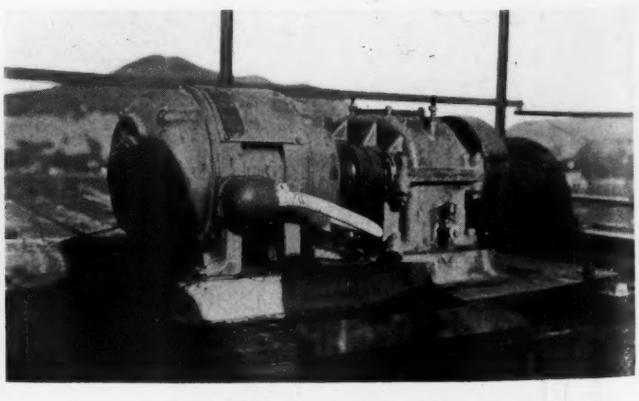
Plant Laboratory

The plant equipment and operating methods provide every facility to insure the production of materials of highest quality and correct grading. Continuous check is kept on the product shipped. A small laboratory has been equipped with mechanical screen shaker, drying facilities, etc. A skilled operator is continuously employed in making screen tests and otherwise checking the product. On all specification shipments a test report is furnished with every car showing grading and fineness modulus on special test report sheets. This care is being well repaid by the

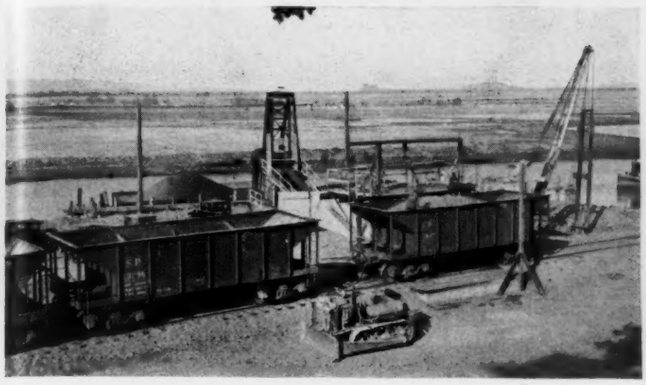


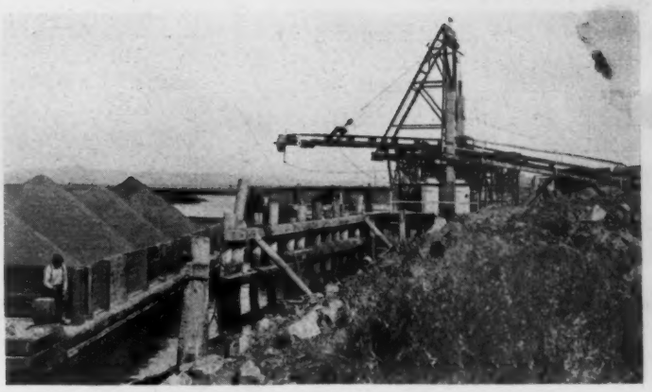
Switches and starters in control house

Control house at feed end of conveyor B



Typical belt conveyor drive





Left: Car-to-barge transfer plant of Basalt Rock Co., Haystack, Calif., has capacity of 500 tons in 50 minutes. Right: Barge load of sand at Haystack. Note hinged section of loading line which folds back, upright, when idle

Bunkers of the Basalt Rock Co., Hamilton Field

of 20 hp. gives positive control of cars through 600 ft. of 1¼-in. cable rigged through blocks to pull in either direction and to give positive braking.

Hopper type cars are discharged through a grizzly into a steel hopper of 50 tons' capacity hung on heavy concrete walls. A 30-in. conveyor belt operated at 300 ft. per min. carries the material 100 ft. to the barges. The conveyor structure is of steel on heavy concrete foundations. The end section, 30 ft. in length, is hinged. Through counterbalances and a small winch, this section is raised and brought back of the pile fender line when not in use.

Geared winches operate a cable fastened fore and aft to the barge being loaded so that loading can be continuous. The loading basin accommodates four barges at one time.

Heavy demands for the pouring of main high workability and strength being obtained in concrete poured.

It is planned, in the near future, to erect at the Healdsburg plant a unit similar to the one at the company's Napa plant for the production of "Basite," an asphaltic concrete paving material.

The capacity of the plant, using the drag scraper alone, is about 125 tons per hour. Using the supplementary capacity of cranes operating in dry pit and on the bar it is about 225 tons per hour.

Water Shipments to San Francisco Bay

About 35 miles south of the plant, at Haystack, on the N. W. P. R. R. and Petaluma river, the company has recently completed the installation of a new plant for transferring materials from cars to barges. This plant was made necessary by the large volume of aggregates which the company is furnishing for the Golden Gate and San Francisco-Oakland Bay bridges.

Material from a nearby hillside was used in building the fill for the spur track which holds 18 loaded cars, with tail room for empties below. Although a 1% grade makes car moving easy, a two-drum Washington Iron Works hoist driven by an electric motor

Fifty carloads of aggregates leaving Healdsburg plant of Basalt Rock Co.

piers and anchor blocks on the Golden Gate bridge have demonstrated a capacity of loading a 2,500-ton barge in 50 min.

In addition to the temporary demand for materials on the Bay bridges, the Basalt Rock Co. also serves by barge a growing market on San Francisco and San Pablo Bays and along the Sacramento and San Joaquin rivers.

Some 15 miles on south from the barge-loading plant is located Hamilton Field, a government base for bombing planes now under construction. Approximately $1,500,000 has already been expended for construction finished or under way at the present time. The program, which started in the summer of 1932, includes leveling and drainage of the flying field, construction of shops, hangars, warehouses, barracks, residences, paved streets and all services.

It is expected that an additional sum of about $3,000,000 will be available for further improvement under the new public works program.

When construction began, the Basalt Rock Co. was assigned a site for a materials bunkerage plant; 1200 ft. of spur track off the N. W. P. R. R. was built by the company. A track hopper was installed with conveyor belt leading to the top of the steel bunkers. On top of the bunkers a shuttle cross conveyor distributes material to the six hoppers of 65 cu. yd. capacity each. Two additional round steel storage bins, also served by the shuttle conveyor, provide additional storage.

A Fairbanks-Morse monorail batcher with dial scale is operated from a working platform beneath the hoppers. Batched materials are furnished to three Jaeger transit mixers of 2 cu. yd. capacity each which have mixed practically all of the concrete poured at Hamilton Field. A cement house is directly attached to the bunkers.

Unusual Design

A unique feature of the bunker design lies in the installation of two sets of bin gates under each compartment. From one set of gates, materials are drawn into the monorail batcher. A conveyor belt runs beneath the second set of gates. The Pacific States Construction Co. of San Francisco has set up its asphaltic concrete plant at the north end of the bunkers. The conveyor belt mentioned discharges directly into the cold end of the rotary dryer. By this arrangement it is possible to feed the "black plant," batch concrete aggregates for the mixer trucks, and to furnish trucks with weighed aggregates, from one set of bunkers at one time, none of these functions interfering one with the other.

Crushed stone for field drainage and base rock for roads at Hamilton Field were brought in from the company's Napa plant by barge. A channel ¼ mile in length was dredged through the shallow bay waters to a mooring basin at the edge of the field. The mooring basin has a six-barge capacity with plenty of water at all stages of the tide.

At the water edge a large wooden bunker was erected, materials being handled by a 1¼-yd. Northwest clamshell rig with 60-ft. boom, operating on a platform resting on pile foundations.

A. G. Streblow is president and general manager of the Basalt Rock Co.; L. A. Cassayre is general superintendent of the company; Lloyd Smead is superintendent of the Healdsburg plant; F. L. Swinson is sales manager.

Lime Industry a Unit on Code

Ohio Hydrate Group Rejoins National Association

THE chief accomplishment of the annual convention of the National Lime Association and of the lime industry at Atlantic City, N. J., June 28-30, was the adoption of a code of fair competition, under the National Industry Recovery Act, to which the great majority of the industry, including the Ohio hydrate group, have subscribed.

Working through a steering committee, the original tentative code was redrafted, in its entirety, several times in the course of the convention. Bernard L. McNulty, chairman of the board of the association and chairman of its Trade Relations Committee, presided.

In its discussions and revisions the convention had the benefit of the advice of two eminent attorneys, one Abram F. Meyers, Washington, D. C., counsel for the National Lime Association, a former member of the Federal Trade Commission, and John E. McLeish, Chicago, Ill., counsel for the Ohio hydrate group and the United States Gypsum Co. These distinguished counsel left no doubt in the minds of producers that they were writing *law*.

The Code

After describing the industry, its product, etc., and competitive practices that have all but destroyed the industry, the code emphasizes the necessity for accurately determining costs. The original draft of the code submitted to the convention contained a definite formula for arriving at a cost to include items of overhead frequently overlooked, especially by the smaller producers. However, the legality of this was questioned and it was stricken out.

Even the flat mandate about selling below cost, of the original draft, was modified so as to permit sales below cost "to meet an established delivered market price."

Hours of Work and Wage Rates

The convention adopted a maximum of an 8-hour day and a 48-hour week, but because of the seasonal nature of the business ask that these limits may be exceeded to meet seasonal requirements, provided the total hours worked over a six months' period shall not average more than these maxima.

The minimum wage was fixed at 25c per hour in the South and 35c in the North.

The reason given for asking more hours or longer days than in the codes of any of the industries thus far made public was that most lime plants are in isolated sections of the country where labor is really hard to get, at least labor trained in lime-kiln operation. [At a subsequent meeting of the committee with Deputy Administrator Malcolm Muir, representing General Johnson, the hours of labor were reduced to 40 hours a week, with exemption to meet seasonal conditions.]

A basing point price system is included in the code, which will make each competitive district operate very much as an open price association, with free interchange of price, terms and other relevant information.

Unfair Practices

Most of the unfair trade practices prohibited by the code are familiar, as they have been given much publicity in the previous code adopted with the Federal Trade Commission. The principal new one provides that all prices, terms and conditions of sale must be filed with the Trade Relations Committee of the National Lime Association not less than five days in advance of the effective date, and must be adhered to until new prices are filed. Such prices are to be published or distributed to the industry. All quotations are to expire 15 days from date, unless specifically renewed, except where otherwise necessary for government, state, county or municipal bid requirements.

For agricultural lime, quotations for the period January 1 to June 30 shall not be made prior to December 1, and for the period July 1 to December 31, not prior to June 1. Commitments shall be for the half-year period only. Quotations to governmental authorities shall not be made prior to 10 days before opening of bids and are void unless the award is made within 30 days, unless specified to the contrary. Calendar quarterly contracts only are to be

accepted, unless otherwise specified in the proposal.

Enforcement

Enforcement of the code and specific details regarding marketing policies are left largely to the various lime manufacturing districts into which the country has been divided ever since the days of the War Service Committee.

The powers and duties of the Trade Relations Committee of the National Lime Association are specifically limited, and it will be largely an appeal body to settle disputes which cannot be settled by the district committees. However, the Trade Relations Committee is given the power to employ confidential agents to police the industry, and either on its own motion or upon complaint, to enforce all the provisions of the code.

Cost of Administration

The cost of the administration of the code is to be prorated on a tonnage basis on all lime manufacturers, whether members of the National Lime Association or not. This provision aroused no comment in the convention although there were several non-member company representatives present. All seemed anxious and willing to bear their full share of this cost. Consequently, while the code will be administered by the National Lime Association, this cost will be kept separate from the cost of the other activities of the association and no undue pressure will be brought to bear on non-member companies to join in these other activities.

Association's Annual Meeting

Practically all the manufacturers remained to take part in the annual meeting of the National Lime Association. President Norman G. Hough opened the sessions with an earnest address "Forging Ahead," in which he frankly discussed both the problems and the opportunities of the industry. He gave unquestionable proof of progress made, particularly in the mortar field, in the last few years, in spite of curtailed building operations. The same opportunity exists in the plaster field, he is positive.

Lime Plaster Opportunities

John C. Best, president of Best Brothers Keene's Cement Co., Medicine Lodge, Kan., elaborated on the opportunities in the plaster field if lime producers would promote and sell the practice of using Keene's cement for gaging lime plaster. He showed more familiarity with lime plaster than many lime manufacturers have exhibited.

Mr. Best outlined five reasons for and seven reasons against the use of lime plaster, which were the results of many years' contact with the building industry in promoting the use of his Keene's cement with lime.

For the use of lime plaster are these reasons, he said: (1) Saving in cost; (2) the fact that lime plaster can be retempered and the droppings from the wall during plastering can be re-used; (3) the plasticity and workability of lime, and hence the productivity of the product; (4) non-corrosion of metal lath; (5) better than competitive materials on wood lath, because its relatively slow setting allows for the wood to readjust itself.

Against the use of lime plaster Mr. Best gave these seven reasons: (1) a belief among the younger generation of plasterers that lime would "burn" their hands, arms, etc.; (2) the messiness, time and space required; (3) the loss of time due to slowness in hardening; (4) tying up the scaffolding between coats; (5) sagging of plaster on metal lath; (6) claim that lime plaster can't be used over bases such as plaster board on ceilings; (7) difficulty in obtaining good fibre in many instances.

Mr. Best considered the plastering contractor by far the most important one to sell. Of the objections to lime plaster he considered the time required the most important; that practically no plasterer denied the virtues of lime plaster. By gaging with Keene's cement this objectionable delay could be overcome.

Mr. Best expressed the opinion that the sale of bulk lime for plaster was out-of-date, except for central mortar plants. That leaves hydrated lime, plain; hydrated lime, fibred, and pulverized lime to be considered. Of the three Mr. Best was quite enthused over the possibilities of pulverized quick lime, and thinks the use of this product for plastering will grow rapidly. He also favors central mortar mixing plants.

Relative Costs

Lee S. Trainor, chief engineer of the construction division of the National Lime Association supplemented and expanded Mr. Best's proposition by exhibiting many figures to show the economy of lime plaster gaged with Keene's cement over competitive materials. On the assumption that:

1 ton of quicklime = 70 cu. ft. of putty.

1 ton of pulverized lime = 80. cu. ft. of putty.

1 ton of hydrate = 46 cu. ft. of putty.

1 ton of neat fibred gypsum = 30 cu. ft. of putty.

1 ton of Keene's cement = 30 cu. ft. of putty.

1 bag of portland cement = 1 cu. ft. of paste of putty.

With neat fibred gypsum @ $20 per ton.

Quick lime @ $20 per ton.

Pulverized lime @ $25 per ton.

Hydrate @ $20 per ton.

Keene's cement @ $30 per ton.

Sand @ $2 per cu. yd.

Hair fibre @ 10c per lb.

Portland cement @ $2.50 per bbl.

Mr. Trainor figured the costs of scratch coat plaster as follows:

Gypsum plaster, 22c per sq. yd.

Quicklime (no gaging), 13.6c per sq. yd.

Pulverized lime (no gaging), 14.3c per sq. yd.

Hydrate (no gaging), 17.5c per sq. yd.

Quicklime (gaged with Keene's cement), 17.8c per sq. yd.

Pulverized lime (gaged with Keene's cement), 18.3c per sq. yd.

Hydrate (gaged with Keene's cement), 21.0c per sq. yd.

Quick lime (gaged with portland cement), 15.0c per sq. yd.

Pulverized lime (gaged with portland cement), 15.0c per sq. yd.

Hydrate (gaged with portland cement), 18.0c per sq. yd.

Similar figures on brown coat work showed savings over gypsum plaster of from 3.85c to 14.73c per sq. yd.

Dry Ice and Lime

Dr. Edward P. Gillette, director of the Gillette Research Corp., Toledo, Ohio, speaking on "Dry Ice and Its Relation to the Lime Industry," emphasized the possibilities of dry ice in the years to come. Frankly he had a proposition to offer in a new lime-burning process, in which the limestone is calcined in a chambered kiln or retort without its coming in contact with the flame. Oil or gas burners are used, and the stone reduced to approximately 1-in. size. Not only is pure CO_2 gas distilled from the stone, but a very pure lime is derived. The process is continuous.

Dr. Gillette has a kiln operating on a commercial scale and is quite positive that it will revolutionize the lime industry. This type of kiln also presents interesting possibilities in the calcining of dolomite so as to recover the magnesia separately. This can be readily done through control of temperature and pressure in the kiln, for the magnesium carbonate calcines at an appreciably lower temperature than the calcium carbonate; and a slight pressure of over one atmosphere retards the calcination of the calcium carbonate without the same effect on the magnesium carbonate.

Representatives of some 60 lime manufacturing companies attended the meeting, representing probably well over 75% of the production of the country.

All present officers of the association were reelected.

Cement Stocks Lower

THE portland cement industry in June, 1933, proudced 7,804,000 bbl., shipped 7,979,000 bbl. from the mills, and had in stock at the end of the month, 19,942,000 bbl., according to Department of Commerce.

Production of portland cement in June, 1933, showed a decrease of 1.5% and shipments a decrease of 13.9% as compared with June, 1932. Portland cement stocks at mills were 17.1% lower than a year ago.

Canadian Statistics for 1932 show shipments of portland cement of 4,498,721 bbl. valued at $6,930,721, compared with 10,161,558 bbl. and $15,825,243 in 1931. Selling prices in 1932 were $2.55 per bbl. high, to $1.25 low.

Aggregate Industries Frame Joint Code

Silica, Core, Foundry and Glass Sand Producers Also Included

PRODUCERS representing approximately 200 sand and gravel companies; 125 crushed stone companies and 10 slag companies, a total of probably more than 75% of the tonnage of commercial aggregates in the United States, met in Chicago, Ill., July 13 to 15, and adopted a joint code of fair competition, in harmony with the requirements of the National Industrial Recovery Act.

The work of arriving at a satisfactory code was handled with remarkable skill and expedition. A preliminary draft of the code had been printed previously and mailed to all producers of record. Numerous changes were made in this code as finally adopted, which will be referred to later.

The boards of directors of the three separate national associations, after sessions on routine matters, met and went over the code, article by article. Various changes were suggested; a steering committee for the convention was appointed, under the chairmanship of Otho M. Graves. Other members of this committee were the same as the members of the temporary control committee, listed in the accompanying insert, with the exception of John Prince, who served as chairman of the joint convention and was elected by the convention to membership on the committee.

Subcommittees were appointed to handle matters covered by each of the articles in the code—preamble, definitions, organization and administration, hours of labor and rates of pay, basis for fair selling price, limitations on plant capacity and new production, unfair trade practices. These subcommittees held hearings for all interested producers, criticisms and suggestions were studied and reports made to the steering committee, where the final decisions upon the code to be reported to the convention were made.

The tentative codes were first discussed in separate conventions of the three industries where every producer had an opportunity to express his convictions in open meeting and to win the approval of his industry, if he could, in support of his contentions. The code, modified by such resolutions as were thus adopted, was then submitted to a joint convention of the three industries, where it was read and adopted, article by article and section by section, with a full and complete opportunity for any producer to speak from the floor and register any objection or suggestion.

The various committees were in session practically continuously, when the industries were not in convention, and their members got very little sleep. The entire industry owes them a debt of gratitude for the unselfish and patriotic duty they performed, regardless of personal discomfort. In a measure, perhaps, they were repaid for their labors by the smoothness with which the conventions worked and the splendid spirit of cooperation and helpfulness exhibited almost unanimously by the entire industry.

Discussion

It is presumed that every producer has seen and read the tentative code mailed to him prior to the convention. Also it can be safely assumed that he will receive a copy of the code in the form it is presented to the Federal Administrator, or modified by him, before the final hearing on its acceptance. Therefore our report will be confined to the general nature of the discussions at Chicago.

In the introductory statement, a letter of transmittal, which gives an accurate picture of the industry, for the benefit of the Federal Administrator, references to price and production control were modified somewhat from the original draft, Section 10, to emphasize the absolute necessity for price and production control. This, of course, was one of the most discussed subjects at the convention; and it was apparently the unanimous opinion of all present that such control could be satisfactorily worked out by the district organizations.

Another change in the introductory statement further emphasizes the unfairness of various forms of governmental competition and asks that it be discontinued entirely. Naturally, there were no differences of opinion on this subject, and the wording of the original section has been much improved to the satisfaction of all legitimate producers.

Portable Plant Operators Included

Article II—definitions of "producer"—aroused much discussion. As originally worded the definition was drawn purposely to exclude operators of portable plants. It developed from the discussion that the consensus of opinion was that such producers would be better subjects for control if they were included. There were representatives of such producers at the convention and no serious objection was raised in their behalf against coming under the code. The definition of "producer" was therefore changed to "a person, firm, corporation or association engaged in recovery, and/or processing" the various aggregates for any and all purposes.

Administrative Organization

The organization and administrative machinery for carrying out the provisions of the code naturally was the hardest problem to solve satisfactorily; and this, Article III, aroused more discussion than all the rest put together. A large part of this discussion had to do with possible interpretations of its provisions rather than with their substance. Also the regioning of the industry aroused more controversy than any other subject considered. These regions, as finally approved by the joint convention of the three industries are:

(1) Maine, New Hampshire, Vermont, Massachusetts, Connecticut, and Rhode Island.
(2) New York (including Long Island).
(3) Pennsylvania, New Jersey, and Delaware.
(4) West Virginia, Virginia, Maryland, and the District of Columbia.
(5) South Carolina, Georgia, Alabama, Florida, and Mississippi.
(6) North Carolina, Kentucky, and Tennessee.
(7) Ohio (including that portion of the Ohio River south of the State of Ohio).
(8) Illinois and Indiana.
(9) Michigan and Wisconsin.
(10) Montana, North Dakota, South Dakota, and Minnesota.
(11) Nebraska and Iowa.
(12) Kansas, Missouri and Oklahoma.
(13) Arkansas, Louisiana and Texas.
(14) Wyoming, Colorado, New Mexico, Utah, Arizona.
(15) California and Nevada.
(16) Washington, Oregon and Idaho.

These regions, it was explained, have little or nothing to do with marketing or competitive areas, but are for the purpose of general administration only. When this idea was generally understood most of the opposition to the regions as established was withdrawn. The original draft provided for 17 regions.

Much of the work of administration of the code is expected to be done by organization of regional subdivisions, which will be groups of competitive producers. These may be organized by any group of producers in a competitive market area, subject to final approval of the regional committee or committees in whose region or regions the market area may be. The provisions for these regional subdivisions in the original draft were clarified and expanded.

The provisions in Section 3, Article III, for the establishment of a National Administrative Committee were modified and expanded in the code as adopted by the convention; to limit the number of slag representatives to the regions in which slag was produced; to make clear that it is part of the purpose of the 12 representatives at large to provide for representation of special interests, such as glass sand, foundry sand, etc. The other members of the committee, with the exception of the six ex officio members (the presidents and secretaries of the associations) are to be elected by the regional organizations of producers, one from each industry in each region.

The National Control Committee, which is really an executive committee of the National Administrative Committee, is to be appointed by the National Administrative Committee; and on this committee each industry will have equal representation. Its number is limited to 15, although the temporary control committee as now set up includes 16. The revised code provides that all questions affecting any particular industry or industries are to be settled by the committee members representing that industry or industries only.

There is no limit to the number of members of the regional or regional subdivision committees except that there must be an odd-number to avoid tie votes.

Problem of Voting

The big controversy of the convention, as to be expected, came over the subject of voting power. There was evidence of unwillingness on the part of big producers to trust their fortunes to a popular vote of their smaller competitors; and there was evidence of distrust of the big producers on the part of the smaller producers. The set-up finally accepted with very little opposition provides that members of the National Administrative, National Control, and Regional Administrative Committees all have one vote each, irrespective of production.

The votes of producers within administrative regions are to be weighted according to their average annual production over the previous five-year period, each producer to have one vote for each 25,000 tons of production, or major fraction thereof, or its equivalent in other units (cubic yards). However, to provide for fair representation on the regional committees, the code specifies that the minority members of the committee (presumably one less than half the committee) are to be elected by popular vote of the producers, irrespective of tonnages.

The section covering the filing of statistics was elaborated to provide that such records are to be kept confidential, except of course that they must be made available to the Federal Administrator.

Hours of Labor and Rates of Pay

After much debate both before the committees and on the floor of the conventions the following schedule was adopted along with a universal 40-hour week. The chief opposition came from employers of Negro labor, which according to all accounts, can not survive much prosperity.

State	Minimum Rate
Alabama	$0.30
Arizona	.30
Arkansas	.30
California	.40
—(North of Tehachapi Mountains)	.50
Colorado	.40
Connecticut	.40
District of Columbia	.40
Delaware	.40
Florida	.30
Georgia	.30
Idaho	.40
Illinois	.40
Indiana	.40
Iowa	.40
Kansas	.40
Kentucky	.30
Louisiana	.30
Maine	.40
Maryland	.40
Massachusetts	.40
Michigan	.40
Minnesota	.40
Mississippi	.30
Missouri	.40
Montana	.40
Nebraska	.40
Nevada	40
New Hampshire	0
New Jersey	
New Mexico	
New York	.40
North Carolina	.30
North Dakota	.40
Ohio (including all operations on the Ohio River)	.40
Oklahoma	.30
Oregon	.40
Pennsylvania	.40
Rhode Island	.40
South Carolina	.30
South Dakota	.40
Tennessee	.30
Texas	.30
Utah	.40
Vermont	.40
Virginia	.30
Washington	.40
West Virginia (east)	.30
West Virginia (west)	.40
Wisconsin	.40
Wyoming	.40

Members of Temporary National Control Committee

THIS COMMITTEE has power to enlarge its membership as it sees fit and to make such changes in the code adopted at Chicago as the Federal Administrator may require; it will also serve as the National Control Committee until the code machinery functions:

OTHO M. GRAVES, chairman, president of the General Crushed Stone Co., Easton, Penn. (crushed stone).

ALEX FOSTER, vice-chairman, vice-president of the Warner Co., Philadelphia, Penn. (sand and gravel).

V. P. AHEARN, executive secretary of the National Sand and Gravel Association.

R. C. FLETCHER, vice-president of the Flint Crushed Gravel Co., Des Moines, Ia. (sand, gravel and crushed stone).

H. V. OWENS, president of the Eastern Rock Products, Inc., Utica, N. Y. (sand, gravel and crushed stone).

R. J. POTTS, president of the Potts-Moore Gravel Co., Waco, Texas (sand and gravel).

F. J. TWAITS, president of the Consolidated Rock Products Co., Los Angeles, Calif. (sand, gravel and crushed stone).

J. R. BOYD, secretary of the National Crushed Stone Association.

RUSSELL RAREY, vice-president of the Marble Cliff Quarries Co., Columbus, Ohio (crushed stone).

W. R. SANBORN, vice-president of the Lehigh Stone Co., Kankakee, Ill. (crushed stone).

STERLING TOMKINS, vice-president of the New York Trap Rock Corp., New York City (crushed stone).

A. L. WORTHEN, vice-president of the Connecticut Quarries Co., New Haven, Conn. (crushed stone).

C. L. McKENZIE, president of the Duquesne Slag Products Co., Pittsburgh, Penn. (slag).

C. E. IRELAND, president of the Birmingham Slag Co., Birmingham, Ala. (slag).

H. J. LOVE, secretary of the National Slag Association.

JOHN PRINCE, president of the Stewart Sand and Material Co., Kansas City, Mo. (sand and crushed stone).

Costs and Selling Price

Article V of the original code was revised by striking out the provision relating to absorption of freight rates, since this is adequately covered in the section on price stabilization, which states that each region or sub-region may make its own rules on establishing a fair selling price. The other provisions in this article relating to selling below cost of production, uniform cost accounting, uniform terms of sale, etc., were merely clarified.

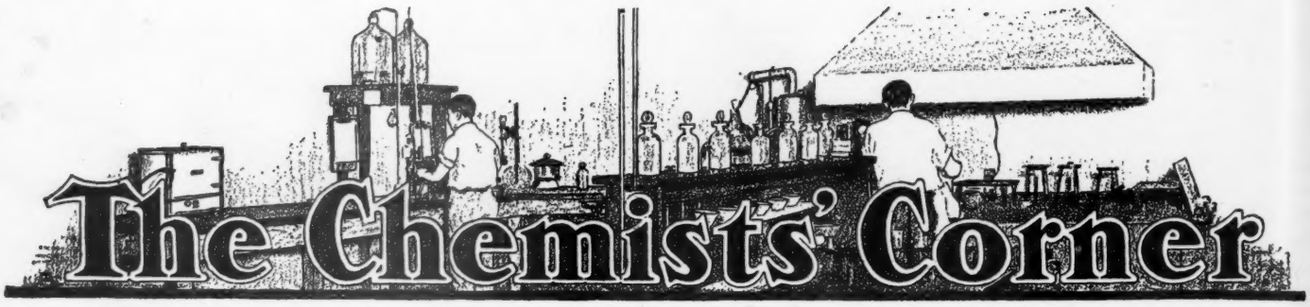
Limitation of Production

The provision in Article VI of the original code designed to limit increase in new productive facilities was revised many times, particularly in view of the fact that the code is now intended to include portable plant operations. The regional committee, under the code, would be given complete authority to pass on the necessity for any added productive facilities, either enlargement of existing plants, or new plants, or the movement of a plant from one site to another. The provision, as adopted by the convention, is so broad that it would prevent the installation of any piece of improved equipment, if the effect was to increase production, or productive efficiency, without permission of the regional committee.

The other provisions of the code covering the definitions of unfair competitive practices are practically identical with those in the original draft.

The sections of the original draft of the code providing for prorating the cost of administration over all producers, and the one providing that research and development work by the National Associations be included in the scope of the code were stricken out.

The costs of administration will be borne proportionately by the National Associations, which will attempt to collect them in the form of dues for voluntary membership. It was practically the unanimous opinion that the provision including research, etc, by the National Associations had no place in "a code of fair competition."



Efficient Cement Clinker Making

The Proper Use of Exit Gas Analyses in the Operation of a Rotary Cement Kiln

By Rapier R. Coghlan

EXIT FLUE GAS ANALYSES can not be properly evaluated and applied without a knowledge of the ultimate composition of the fuel employed. Few cement laboratories are properly equipped to make ultimate analyses of fuel and, being unaware of the advantages to be derived from such analyses, are deterred from having them made by what are considered high charges by commercial fuel testing laboratories.

A previous article by the writer, in Rock Products, November 19, 1932, has shown that very reliable ultimate analyses can be gotten from the bulletins of state and federal governments. These analyses show trifling variations between different samples of coal from the same seam and locality. However, where a consumer is using coal from the same seam and locality, it is better to sample this coal over a considerable period, and to have at least one ultimate analysis made by a reliable laboratory for comparison with analyses obtained from other sources.

The three combustible elements in coal are carbon, hydrogen and sulphur. We are concerned with the "net hydrogen" of coal, which is the hydrogen remaining after the oxygen of the coal has been satisfied with hydrogen to form "water of composition." Net hydrogen manifests itself in a gas analysis by an excess of nitrogen over that which accompanied the oxygen that combined with the carbon and sulphur. Since the net hydrogen combines with oxygen to form water, which does not appear in the gas analysis, its former presence is indicated by the excess nitrogen, the only product of the reaction which we can measure.

The ultimate analysis of La Salle Coal Seam No. 2 will serve to illustrate what is meant by "net hydrogen."

Constituent	Per Cent
Carbon	61.10
Hydrogen	4.23
Nitrogen	1.00
Oxygen	6.96
Sulphur	3.34
Moisture	14.87
Ash	8.50
	100.00

The 6.96 parts of oxygen require 6.96 / 8 = 0.87 parts of hydrogen to form 6.96 + 0.87 = 7.83 parts of "water of composition."

Therefore there remain 4.23 — 0.87 = 3.36 parts of "net hydrogen."

Now since most of the reactions of combustion are volume reactions, it is well to understand the expression "pound-mol," and to grasp the idea that the reactions are molal reactions. It simplifies the calculations involved. A "pound-mol" is the molecular weight of a gas expressed in pounds. The gas is at a temperature of 32 deg. F. and 29.92 in. of mercury pressure, or what is commonly designated as standard conditions, abbreviated to S. C. At standard conditions —S. C.—a pound-mol of the gases we are concerned with occupies a volume of 359 cu. ft. Thus a pound-mol of carbon, sulphur, nitrogen, etc., each occupies a volume of 359 cu. ft.—S.C. In combustion work carbon and sulphur are both assigned molal volumes as they appear in the gaseous form in their combinations present in combustion gases.

Referring back to the ultimate analysis of the illustration, we find that there are two constituents of the coal that will bear a constant relationship to each other—carbon and net hydrogen. Sulphur and the other constituents vary. The ultimate analysis is converted into a molal analysis by dividing the percentage of each constituent by its respective atomic or molecular weight as follows:

Carbon .....61.10/12, 5.0917 mols.
Net hydrogen ..... 3.36/ 2, 1.1800 mols.
Sulphur ..... 3.34/32, 0.1044 mols.
Nitrogen ..... 1.00/28, 0.0357 mols.
Water of composition and moisture .....21.70/18, 1.2055 mols.

The important molal reactions of combustion of coal that concern us are:

(1) $C + O_2 = CO_2$ (1 mol C unites with 1 mol O_2 to form 1 mol CO_2)
(2) $2C + O_2 = 2CO$ (2 mol C unites with 1 mol O_2 to form 2 mol CO)
(3) $2CO + O_2 = 2CO_2$ (2 mol CO unites with 1 mol O_2 to form 2 mol CO_2)
(4) $S + O_2 = SO_2$ (1 mol S unites with 1 mol O_2 to form 1 mol SO_2)
(5) $2H_2 + O_2 = 2H_2O$ (2 mol H_2 unites with 1 mol O_2 to form 2 mol H_2O)

Other reactions occur, but do not concern this discussion.

A study of the foregoing reactions shows that while 1 mol of carbon or sulphur each requires 1 mol of oxygen for complete combusion, 1 mol of hydrogen requires only 0.5 mol of oxygen. Volume percentages and molal percentages are identical in gas analyses. In combustion work it is sufficiently accurate to consider air as having the volumetric composition of 79% nitrogen and 21% oxygen, a molal relationship of 3.76 N_2 to 1 O_2. This relationship is of prime importance as most combustion is carried out with air as the source of oxygen.

How to Use Coal Analyses

Bearing in mind the molal composition of the coal given above and the possible reactions, we find the following resultant composition when combustion effected is perfect:

Constituent of flue gas	Wet Basis Mols	Wet Basis Per Cent	Dry Basis Mols	Dry Basis Per Cent
CO_2	5.09	17.69	5.09	19.26
SO_2	0.10		0.10	
H_2O	2.39	8.15	0.00	
N_2	21.76	74.16	21.76	80.74
	29.34	100.00	26.95	100.00

The O_2 equivalent to the N_2 is.....80.74 / 3.76, or....21.47 mols
The O_2 equivalent to CO_2 and SO_2 is.....19.26 mols
The O_2 equivalent to net H_2 is.....2.21 mols
Therefore net H_2 is.....(2 × 2.21)....4.42 mols

The ratio of net H_2 to $CO_2 + SO_2$, or H_2:C + S, is 4.42 / 19.26 = 0.229.

Referring to the ultimate analysis it is seen that the ratio H_2 : C + S is 1.18 / 5.19 = 0.227. The discrepancy of 0.002 is occasioned by the fact that it is impossible to differentiate the N_2 coming from the coal from that in the air required for combustion. It will be shown later that this error is so slight that it does not affect the value of the results predicated on the use of the total N_2 and ratio of H_2: C + S in determining the ratio of fuel to clinker in cement kiln work.

It has been stated that the net H_2 bears a constant relation to the C in any given coal. Therefore, the combustible part of the coal may be formulated as requiring O_2 in the manner (C + S) + 0.5 H_2, or 1 + (H_2: C + S) / 2. We have just seen from the dry gas analysis that the H_2: C + S is 0.229. Therefore, the O_2 requirement is 1 + 0.229 / 2, or 1.1145. In the above case we saw that the O_2 equivalent of the N_2 was 21.47 mols. Therefore, if we divide this by 1.1145 we find that 21.47 / 1.1145 = 19.26 mols $CO_2 + SO_2$, or 19.26 mols C + S. If we use the ratio obtained from the ultimate analysis of the coal, 21.47 / 1.1135 = 19.28 mols $CO_2 + SO_2$, or C + S. Since ordinary gas analyses are read to the nearest one-tenth of a milliliter, it is apparent that the error is negligible and that the N_2 from the coal introduces a negligible quantity.

Because of the wide differences between the atomic weight of carbon and the molecular weight of sulphur it is necessary for the greatest accuracy to determine the molal ratio between S and C. In this particular case the ratio is 0.1044 / 5.0917 = 0.0205. Therefore, if we divide the mols of $CO_2 + SO_2$ by 1.0205 we obtain the mols of CO_2, or C. In this case, 19.26 / 1.0205 = 18.87 mols CO_2 or C. Check 5.09 / 21.76 = 18.88 mols.

The reliability of the H_2: C + S ratio may be questioned. To remove any doubt data collected during the emptying of a kiln for relining are submitted. The coal was sampled throughout the test period and a careful ultimate analysis was made by a reliable firm of combustion engineers. The ratio calculated from the analysis was 0.349.

Time	CO_2	CO	O_2	N_2	
9:05	23.4	0.1	3.9	73.6	Raw feed going into kiln.
9:20	23.8	0.2	3.0	73.0	
9:35	23.4	0.3	3.2	72.7	
9:45	26.9	0.2	1.1	72.8	
10:00	24.8	0.0	3.4	72.8	
10:10	24.4	0.0	2.9	72.7	Kiln feed cut off.
10:20	24.8	0.0	5.0	72.2	
10:30	25.6	0.0	1.2	73.2	
10:40	29.8	0.1	0.1	70.0	
10:50	30.5	0.8	0.1	68.6	
11:00	29.6	0.8	0.2	69.4	
11:10	27.4	0.8	0.0	71.8	
11:20	24.9	0.4	0.1	74.5	
11:25	18.0	0.1	0.2	81.7	
11:33	18.0	0.0	1.0	81.0	Fire drawn from kiln.

The last two analyses represent the combustion of the fuel alone. There is no trace of CO_2 from the raw mix as it has all been calcined and the kiln is empty. These two analyses average:

CO_2	18.00%
O_2	0.60%
CO	0.05%
N_2	81.35%
	100.00%

Evaluation of Analysis

The molal composition of the coal used at the time was:

Constituent	Mols	
Carbon, C	5.39	(Total C is 64.60%)
Sulphur, S	0.08	
Net hydrogen, H_2	1.72	

H_2 : C + S = 1.72 : 5.39 + 0.08, or 0.314.

S : C = 0.08 : 5.39, or 0.015.

Evaluation of analyses:	Perfect	Complete	Incomplete
(*a*) O_2 equivalent to N_2	18.72	19.20	18.67
(*b*) Less free O_2	0.00	0.60	.40
	18.72	18.60	18.27
(*c*) Less O_2 with CO	0.00	0.00	1.40
(*d*) O_2 with C to CO_2, S to SO_2, net H_2 to H_2O	18.72	18.60	16.87
(*e*) O_2 with C and S [(*d*) / 1.157]	16.18	16.08	14.58
(*f*) O_2 with C to CO_2 [(*e*) / 1.015]	15.94	15.84	14.36
(*g*) CO_2 from mix [Total CO_2 — (*e*)]	13.42	11.12	12.02
(*h*) Total C from coal [(*f*) + CO in gas analysis]	15.94	15.84	17.16
(*i*) Total pounds C from coal [12 × (*h*)]	191.28	190.08	205.92
(*j*) Total pounds coal [(*i*) / .646]	296.09	294.24	318.76
(*k*) Pounds CO_2 from mix [44 × (*g*)]	590.48	489.28	528.88
(*l*) Barrels of mix [(*k*) / 179]	3.298	2.733	2.955
(*m*) Pounds coal per barrel (*j*) / (*l*)	89.97	107.66	107.87

O_2 equivalent to N_2, 81.35 / 3.76	21.77 mols
O_2 free	0.60 mols
	21.17 mols
O_2 with CO_2, CO, and SO_2	18.03 mols
O_2 with net H_2	3.14 mols

Therefore net H_2 is 2 × 3.14 = 6.28 mols.

H_2 : C + S = 6.28 : 18.05, or 0.347. This is in very close agreement. The burning zone offers an ideal place for combustion of coal and the reactions are generally completed before the gases leave the kiln.

Later this coal was burned in a spare boiler furnace and sampling of the gases gave identical results for the ratio. This ratio is a definite quantity for any particular coal. Therefore, an ultimate analysis of the coal is always desirable.

We are primarily interested in the application of the method to cement kiln gases with their high CO_2 content compared with straight fuel combustion. In kiln practice we occasionally find perfect combustion of the fuel, with no free O_2 or CO. More generally we find complete combustion with an excess of free oxygen over that necessary to complete the combustion of a small amount of CO present, because of inability to thoroughly mix the coal and air. Then we find cases where CO is greatly in excess of free O_2 and indicates insufficient air for complete combustion.

The evaluation of cases of these three combustion conditions should serve to fix the method and demonstrate its efficacy in determining the ratio of fuel consumed to barrels of clinker produced. The examples are typical of cement kiln practice.

	Perfect	Complete	Incomplete
CO_2	29.6	27.2	26.6
O_2	0.0	0.6	0.4
CO	0.0	0.0	2.8
N_2	70.4	72.2	70.2
	100.0	100.0	100.0

The foregoing examples were picked at random from a 48-hour test, sampling being at 20 min. intervals. The average for this test follows:

CO_2	26.60%
O_2	0.68%
CO	0.58%
N_2	72.14%
	100.00%

(*a*) O_2 equivalent to N_2	19.19 mols
(*b*) Less free O_2	0.68 mols
	18.51 mols
(*c*) Less O_2 with CO	0.29 mols
(*d*) O_2 with C to CO_2, S to SO_2, H_2 to H_2O	18.22 mols
(*e*) O_2 with C and S [(*d*) / 1.157]	15.75 mols
(*f*) O_2 with C to CO_2 [(*e*) / 1.015]	15.51 mols
(*g*) CO_2 from mix [Total CO_2 — (*e*)]	10.85 mols
(*h*) Total C from coal [(*f*) + CO] in gas analysis	16.09 mols
(*i*) Pounds of C from coal [12 × (*h*)]	173.08
(*j*) Total pounds of coal [(*i*) / .646]	267.90
(*k*) Pounds CO_2 from mix [(*g*) × 44]	477.40
(*l*) Barrels of mix [(*k*) / 179]	2.6690
(*m*) Pounds of coal per barrel [(*j*) / (*l*)]	100.37

It is also possible to calculate the air supplied the fuel from the work just done on the gas analyses. The last case will show the method to be followed:

O_2 equivalent to the N_2 of the gas analysis was	19.19 mols
O_2 required by C to CO_2, S to SO_2, H_2 to H_2O	18.22 mols
O_2 required by CO converted to CO_2	0.58 mols
Total O_2 requirements	18.80 mols

Therefore the air supplied was 100 × 19.19 / 18.80 = 102.07%.

(*Continued on next page*)

Total clinker produced by 3 kilns on 2nd shift.....1,326 bbl.
Total coal weighed by feeders.....146,625 lb.
Pounds of coal per barrel.....110 12

	No. 1 Kiln	No. 2 Kiln	No. 3 Kiln
Barrels of mix per 100 mols flue gas	2.977	2.040	2.915
Pounds of coal per 100 mols flue gas	303.7	292 8	300.3
Pounds of coal per barrel	102.0	143.0	103.0
Barrels of clinker ($\frac{\text{coal feeder weights}}{\text{pounds coal per barrel}}$)	474	362	502
Total barrels of clinker		1338.	
Pounds coal per barrel—Total coal / Barrels		109.14	

A kiln system was equipped with automatic coal weighing feeders and clinker scales that weighed the entire output of the kilns. Three kilns are in this layout. Here are presented actual results and those obtained by the method described.

Here it is seen that the error is less than 1% for either barrels produced or pounds of coal per barrel. This is well within the limits of accuracy of either the clinker scales or the coal weighing feeders.

Many more examples could be cited, extending over long periods, that prove the advantages of this method of evaluating the gas analyses and calculating production of clinker if coal weight is known, or pounds of coal per barrel if clinker weight is known.

As a final warning and a repetition, it is essential that the ultimate analysis of the fuel be known and that all gas analysis work be done carefully and systematically. If this is done the relative performance of kilns in the same layout can be determined and discrepancies of performance corrected.

Hints and Helps for Superintendents

Conveyor Skirt Boards

THE SAND AND GRAVEL PLANT built by Six Companies, Inc., at Junction City, Nev., is one of the well built plants of the United States. This plant supplies the aggregate for the Hoover dam.

The plant is of structural steel throughout and while the plant is for temporary use, compared with a commercial operation, it is rigidly and substantially built from beginning to end. A world of care has been given to details such as the skirt boards for some of the larger conveyors used on the project.

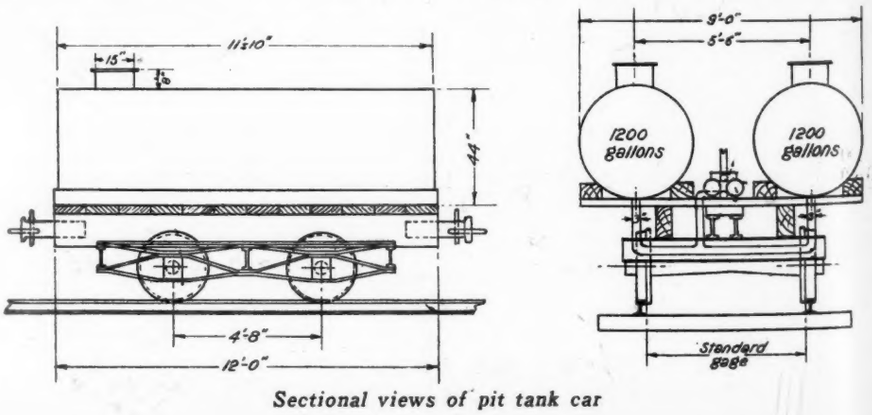
Skirt boards are quite substantial at this temporary plant

The illustration shows the steel skirt boards for the off bearing conveyor from the 16-in. gyratory crusher which is used to crush the larger boulders. The skirt board, instead of the usual slip shod, rickety affair that is found in many plants, is as substantial as the balance of the plant. The conveyors are all Alemite lubricated.

Servicing Oil-Burning Equipment in Pit

SERVICING oil-burning steam-shovels and locomotives at the Durbin, Calif., sand and gravel plant of the Consolidated Rock Products Co. is described by Harry D. Jumper, engineer of the company, in U. S. Bureau of Mines I. C. 6607.

All steam equipment uses oil for fuel which is delivered to the plant reservoir in tank cars and is unloaded by gravity. The reservoir is a circular concrete tank with a capacity of four tank-car loads. The top of the tank is 3 ft. below the rails. Adjoining and at the bottom of the concrete tank is a 3-in. geared pump used to force the oil through a system of pipe lines to a tank in the pit, and for re-fueling the steam equipment around the plant. Refueling of all plant equipment is done at night by a hostler. The fuel-oil tank in the pit is located near the foot of the inclines on the permanent track. An especially designed tank car is used to carry oil from it to the oil-burning equipment. The details of this tank car are shown in the accompanying illustration. The car consists of two horizontal tanks mounted side by side on the running gear of a standard-gage pit car. Each tank has a dome through which the tank is filled. The oil is drawn from the bottom of the tanks through a manifold, as shown, and enters the suction side of a duplex pump. The discharge is fitted with a rubber hose through which the oil is pumped to the shovel or locomotive. The switching of the fuel car is done by the locomotive which serves the shovel and is taken on one of its regular trips and left at the shovel to be unloaded. The car is then returned to the oil spout and refilled, where it is left until needed.



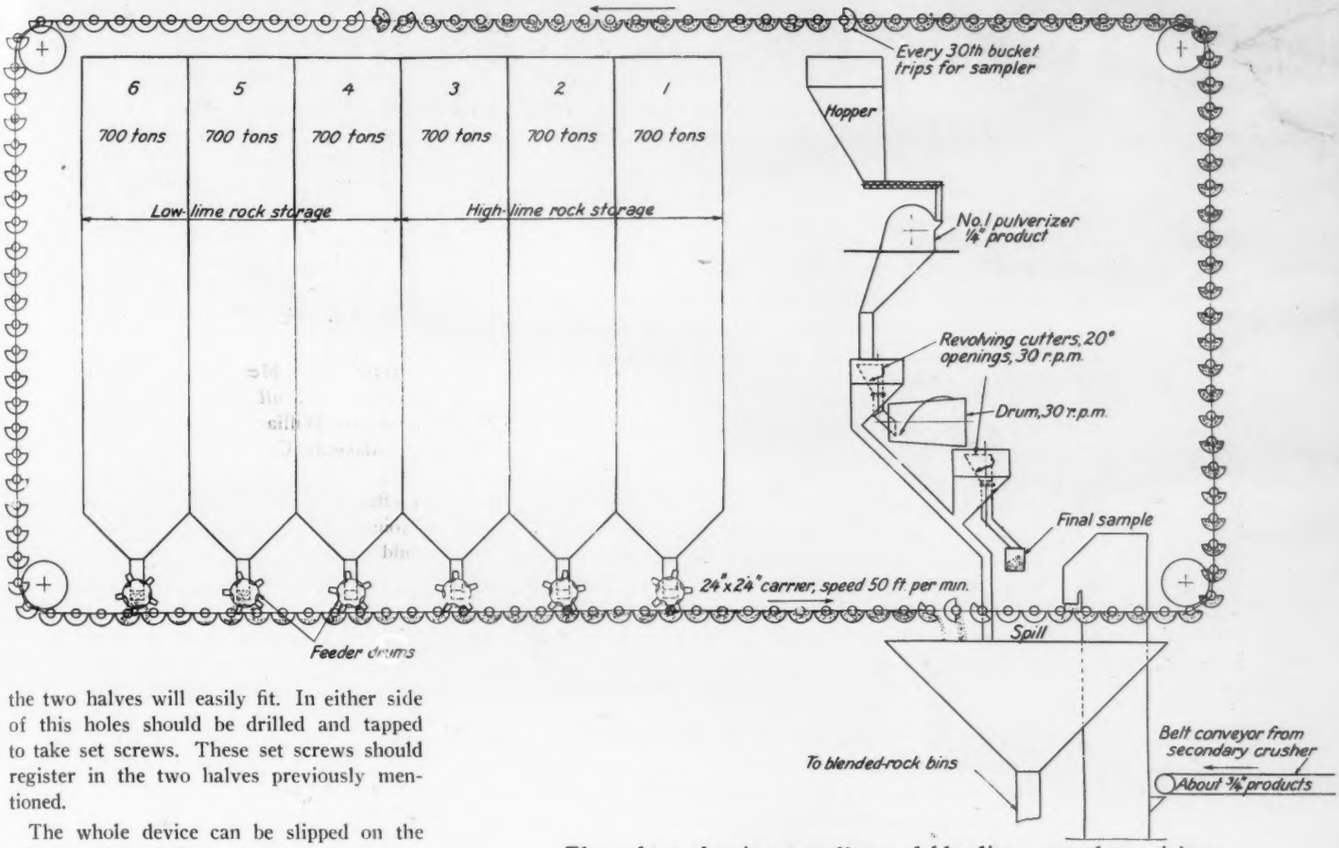
Sectional views of pit tank car

Cutting Wire Rope

W. E. Warner
Melwyn Garden City, Herts, England

WHEN cutting wire rope, unravelling of the strands can be prevented by the following device:

Get a piece of metal tubing that will easily slip on the cable and saw this in half. Then get a second piece of tubing into which



Flow sheet showing sampling and blending control provisions

the two halves will easily fit. In either side of this holes should be drilled and tapped to take set screws. These set screws should register in the two halves previously mentioned.

The whole device can be slipped on the cable to where desired, the set screws can be tightened, the whole cable will then be firmly gripped so that any movement of the strands will be impossible.

Sampling and Blending Cement Raw Mix

THE El Paso, Tex., plant of the Southwestern Portland Cement Co. is one of the older dry process mills, but an interesting method of blending and sampling has been developed. It is described by Robert T. Mann, engineer of the company in U. S. Bureau of Mines I. C. 6608.

The elevator from the secondary crusher discharges into the lower run of a 24 by 24 in. pivoted bucket carrier which is 428 ft. long and serves six 700-ton concrete bins, either filling or emptying them. It is driven about 55 ft. per min. by a 20-hp. motor.

The first sampling is done on the upper run of this carrier before it reaches the storage bins. (See accompanying elevation.) One bucket out of every 30 is tripped and discharged into a No. 1 pulverizer direct connected to a 20-hp. motor, operating at 1,120 r.p.m. The product of this mill, about ¼-in. in size, falls into a 26-in. Vezin sampler and is cut twice with 20 deg. cutters. The final sample is taken hourly to the laboratory for an analysis which determines whether the rock shall go into the high-lime or the low-lime rock bins.

Due to the fact that the carrier buckets underneath the storage bins do not overlap it has been an awkward and dusty operation to draw rock from the bins. However, the crusher foreman has recently developed an automatic bucket feeder, which is operated by the carrier and which allows no spill between the buckets. With this arrangement a small amount of rock may be drawn from each of the 6 bins at one time, thus blending the rock to a uniform mix. This installation eliminates the use of one man in the tunnel who previously filled the buckets and prevented as much spillage as possible.

The blended rock is now dumped into a hopper which is connected to the foot of a 30-in. by 70-ft. vertical bucket elevator. This elevator is of chain construction, has a double row of 12-in. buckets spaced on 12-in. centers, and is driven 114 ft. per min. by a 35-hp. motor through a countershaft. The elevator has a steel casing.

At this point the material was at one time dropped through a weighing machine. This machine, however, has since been taken out, and the rock merely goes through a hopper to a 30-in. horizontal belt conveyor running 105 ft. per min. which delivers it to the foot of another 30-in. by 60-ft. bucket-and-chain elevator operating at 120 ft. per min. The buckets are spaced on 12-in. centers.

From the top of this elevator the rock is chuted through another Vezin sampler where a 36 deg. cutter takes part of the rock. The sample is cut again and then ground in another No. 1 pulverizing mill, from which it passes through another 26-in. Vezin sampler for the final sample, as previously described.

The main portion of rock discharges on a 24-in. belt conveyor which serves the full length of six 700-ton blended-rock bins. Of this belt conveyor the first 106 ft. are inclined at an angle of 8 deg. 30 min.; the rest is horizontal. Its total length between pulleys is 236 ft. and it travels 398 ft. per min.

The rock is further blended by distributing the discharge of the conveyor to several bins by means of an automatic belt tripper traveling 50 ft. per min.

The two elevators just described and the belt conveyors are all driven from the same countershaft.

Three men and a foreman are employed in the crushing and blending departments, who work eight hours per day.

Opening a Flooded Quarry

HOW a large slate quarry was drained quickly of flood waters without resort to pumping is described in *Quarry and Road-making*, London journal. A hundred feet of water submerged one vein of the Oakley quarries, Blaenau Festiniog, which was dewatered by use of a compressed air plant.

To dewater a larger, additional area, a five-inch hole was bored through an adjoining mountain side. Drainage was quickly effected. Diamond and hard steel cutters were used for the sideward drill. It is estimated that 45,000,000 gal. of water were drained, thus opening up an extensive area to be worked through 70 underground chambers.

Rock Products News Briefs

Crushed Stone

New Castle Lime and Stone Co., New Castle, Penn., it is reported, will spend $25,000 on improvements at the mine of the Kittanning Limestone Co., Kittanning, Penn., recently acquired by the New Castle company. Improvements include a new railway switch, additional machinery and a new river dock.

◈ ◈ ◈

New York State Crushed Stone Association met at Penfield, N. Y., May 17. The place of the meeting was the picnic grounds of the Penfield sand plant of the Dolomite Products Co. John Odenbach, president of the company, was host. The principal subject of discussion was wayside pit competition. The members of the association were given an opportunity to inspect the new self-unloading Diesel-powered canal and lake boat designed by John Odenbach and being built at Rochester for the Dolomite Products Co.

◈ ◈ ◈

Lime

Virginia Lime Products Corp., headed by Maurice D. Langhorne, 336 Woodland Ave., Lynchburg, Va., has acquired the former Moore Lime Co., Eagle Rock, Va. Early operation of the property is planned. New equipment will be installed, including cable conveyor from quarry on other side of James River, and other mechanical-handling machinery. J. W. Seay will continue as plant manager.

◈ ◈ ◈

Louisiana Lime Products Corp., Pine Prairie, La., has appointed F. O. Withrow, recently superintendent of the Peerless White Lime Co. operation, St. Genevieve, Mo., manager. Mr. Withrow writes that railway connection was completed in June, and on June 9 ground was broken for two or more kilns. A crushing plant has been completed and is in operation. The lime plant will be modern in every respect, according to Mr. Withrow.

◈ ◈ ◈

Century Masonry Cement Co., Rosendale, N. Y., announces resumption of operation, and a new product, "Rocktite" admixture "for improving and waterproofing portland cement concrete." Other products are dark and light masonry cements and hydrated lime.

◈ ◈ ◈

Cement

Wage Increases, a result of the early action of the portland cement industry on its code of fair competition, have resulted in many columns of helpful publicity in newspapers all over the country. Increases in prices ranging up to 25c per bbl. were announced about the same time, and so far as newspaper clippings received to date show, these have been accepted without unfavorable comment.

Universal Atlas Cement Co., Chicago, Ill., announces a plan of employe representation at all its plants. A copy of the plan has been given all employes. It provides for the election of a committee of not less than five nor more than 30, depending on the number of employes, one for each 100 in the smaller plants and 500 in the larger. Candidates for committeeman must have been on the payroll for one year; must be 21, or older, and an American citizen. He is not to be discriminated against on account of race, creed, or union membership, or nonmembership; he must not be an officer or person with hiring and firing authority. The committee will form their own organization and consider safety and accident prevention, economy and waste prevention; wages, piece work and tonnage rates; hours of work and working conditions; housing and living conditions; health and works sanitation; education and publications; athletics and recreation; continuity of employment and condition of industry. The management of each plant appoints representatives in equal number to the workmen's committee to form a joint committee to dispose of problems or difficulties.

◈ ◈ ◈

New York City's Board of Estimate voted unanimously May 26 that all city contracts during the economic emergency will call for American-made portland cement. At the solicitation, or as the result of the agitation, of Samuel Untermyer, former "trust-busting" attorney, the Board repealed its action on July 6.

◈ ◈ ◈

Marquette Cement Manufacturing Co.: Control of the company may pass to Miss Bertha Evans, private secretary of the late Theodore G. Dickinson, founder and president of the company. Mr. Dickinson's will left the residue of his estate, valued at more than a million dollars, to Miss Evans, after bequeathing 1,000 shares of common stock in the cement company to his son, Robert B. Dickinson, 500 shares of preferred stock to his daughter, Miss Rose Dickinson, and 400 shares of common to Richard Moyle, Sr., general superintendent of the company.

◈ ◈ ◈

Pacific Coast Merger: The Pacific Coast edition of the *Wall Street Journal* reports an address of William W. Mein, president of the Calaveras Cement Co., San Francisco, Calif., to his company employes, recently, to the effect that his company has now declined to join in the proposed consolidation, which would have comprehended Pacific Portland Cement, Santa Cruz Portland Cement and Yosemite Portland Cement companies with a total of about $23,000,000 of assets and a daily average plant capacity of some 23,000 bbl. Such a merger would have left the Henry Cowell Lime and Cement Co., operating at Mt. Diablo, east of San Francisco, and Monolith Portland Cement Co., in the lower San Joaquin Valley, as the only two outside factors in Northern and Central California business. Mr. Mein is stated to have indicated that his company now proposes to follow an independent policy, but stands ready to accept terms of a code under the National Industrial Recovery program for the cement industry when and if such a code is negotiated.

◈ ◈ ◈

Calaveras Cement Co., San Francisco, Calif., expects next month to go into full production on a pure white cement of special specifications not heretofore marketed in quantity on the Pacific Coast because of eastern manufacture. Plans also are complete to market special specification submarine cement and cement paint. The company also has plans to install its own truck and barge transportation system to San Francisco Bay by way of the Stockton deep water channel unless freight rate reductions, now being sought, are obtained.

◈ ◈ ◈

Volunteer Portland Cement Co., Knoxville, Tenn., is exhibiting at various cities in its sales territory a miniature mill, an exact replica of its own plant. It is a working model and is attracting much attention and newspaper comment.

◈ ◈ ◈

Slag

C. W. Pope Co., Cleveland, Ohio, has recently completed a plant for the manufacture of slag wool. The process consists of melting the slag in a cupola furnace, with alternate layers of slag and coke, and blowing live steam through the outflow of melted slag.

Hope THIS Will Be Enforced!

THE CODE of the Associated General Contractors of America submitted to the National Recovery Administration contains this clause:

Article V.—Section 4. Bids Confidential—A general contractor shall not convey to any subcontractor or material vendor any substantial information prior to the award of the particular subcontract relating to the bid of any other subcontractor or material vendor who has made a bid to him or to any other general contractor, nor shall he mislead or deceive any subcontractor or material vendor as to the amounts and conditions of other bids for the purpose of obtaining a lower bid.

Editorial Comments

Competition Under New Codes

The belief is quite prevalent at this time that "codes of fair competition" must be specialized for each and every industry, or branch of industry. Study of the codes of the several hundred or thousand industries, after they have been written, will, we believe, show that unfair competitive practices intended to be eliminated may be boiled down to variations of a very few fundamental "bad management" practices. So, out of all this experience of industry in seeking out unfair competitive practices, and shooting at them individually, will come a real master code, written or unwritten—it will be *a code for fair management*. For good, fair, efficient management is governed by the same principles everywhere.

Probably out of this universal business house-cleaning, under Federal encouragement and supervision, ultimately will arise a real profession of management, which will have ideals and ethics as ingrained as those of other professional men, such as engineers and physicians. Those ideals and ethics will govern decisions of business policy, whether men manage their own business or their stockholders'. Managers of the future who recognize no codes will never be eliminated any more than occasional crooked engineers or quack doctors are eliminated, but the weight of their profession backed by public opinion will be against them and their unfair or questionable methods.

The first principle in a code of fair competition, or better a code of fair management, is recognition and acceptance of the fact that a fair and equitable distribution of the products of industry (including profits) is essential to the health of society. To drive home this first principle is the main object of the National Industrial Recovery Act. The second principle, we would say, is to know your cost accurately, not to sell below that cost for the purpose of unnecessarily injuring a competitor, and once you have made your price, stick to it. (We say unnecessarily injuring a competitor, because occasions may arise when public interest as well as your interest calls for the elimination of an unprogressive competitor.) A third principle is recognition of the limitations of your industry and of your own part of it—recognition that success does not mean necessarily being a bigger producer than your competitor, or that growth and progress necessarily mean a constantly expanding output at the expense of your competitors. Successful management will be measured by the steady return of capital rather than its constant expenditure. The average investor desires an assured regular income and the ultimate return of his investment rather than a gambler's chance to double up or lose all.

Let no producer fool himself with the idea that these codes are going to eliminate competition and make it easier for poor management to get by. Hitherto, poor or inefficient management may have had the advantage of cheap labor; now, this advantage is lost because wage rates will become more or less standardized, not only in his industry but in all industry. He may think that a share of the available business is now assured him, under the code, without his having to trouble much to go out after it. He will be greatly mistaken; for while his competitors possibly can agree that he *may* have 10% or 25%, or what not, of the available business, there is no way that his competitors can keep the customers from preferring or specifying some one else's product.

The new codes have not by any means assured either a producer's own business or his industry a *status quo*. They have not changed and cannot change fundamental truths. It will still be impossible to stay in business with obsolete, worn-out equipment. With uniformly high-priced labor the difference both in quantity and quality of output between efficient, up-to-date equipment and obsolete, worn-out equipment will be more than ever accentuated. For example: The change to 6-hour shifts in the cement, lime and gypsum industries will obviously require four different kiln or kettle attendants in a day, with four different pairs of eyes and four different kinds of intelligence. It is obvious that the manufacturers who have installed automatic, or semi-automatic instrumental control will have a great advantage.

For, with uniform selling prices, such as very likely will grow out of the codes, *quality* will be *all important*. The purchasers may be depended upon to insist upon the *best* the market affords, and we know of no code or law which can ever be enacted to compel a prospective purchaser to accept a substitute for what he wants, when what he wants can be obtained. The code may entitle the unprogressive producer to his share of this business, according to his present understanding of the code, but he will soon learn that neither the public nor his competitors are interested in seeing him get it, unless he can meet this new competition for good management. A code of good, fair, efficient management will include *"do"* as well as *"don't"* principles; present tentative codes are suppressive rather than constructive.

Copies of Codes

IF ANY READER of Rock Products in the United States is a producer of crushed stone, sand, gravel or slag, or of lime, and has not received an official copy of the proposed tentative codes of these industries, he should immediately communicate with the National Associations in these industries.

The names and addresses are:

National Crushed Stone Association, 1735 Fourteenth St., N. W., Washington, D. C.

National Sand and Gravel Association, 545 Munsey Bldg., Washington, D. C.

National Slag Association, 1449 Leader Bldg., Cleveland, Ohio.

National Lime Association, 928 Fifteenth St., N. W., Washington, D. C.

Recent Quotations on Rock Products Securities

Stock	Date	Bid	Asked	*Dividend
Allentown P. C. com.[47]	7-20-33	5	7	
Allentown P. C. pfd.[47]	7-20-33	7	10	
Alpha P. C. com	7-20-33	21½	22½	
Alpha P. C. pfd	7-11-33	75	....	1.75 qu. June 15, '32
Amalgamated Phos. 6's, 1936[47]	7-20-33	94	96	
American Aggregates, com.[47]	7-20-33	1	3	
American Aggregates, pfd.[47]	7-20-33	15	20	
American Aggregates 6's, w. w.[47]	7-20-33	26	30	
American Aggregates 6's, ex. w.[47]	7-20-33	25	28	
American L. and S. 1st 7's[47]	7-20-33	36	40	
Arundel Corp. com.[47]	6-29-33	23 actual sale.		50c qu. July 1, '28
Bessemer L. and C. Class A[47]	7-20-33	3	5	
Bessemer L. and C. 1st 6½'s[47]	7-20-33	20	22	
Bessemer L. and C. cert. of dep.[47]	7-20-33	20	22	
Bloomington Limestone 6's[47]	7-20-33	5	8	
Boston S. & G. new com.[37]	7-10-33	1	3	
Boston S. & G. new 7% pfd.[37]	7-10-33	5	10	1.75 qu. Jan. 3, '33
Boston S. & G. 7's, 1934[19]	7-10-33	40	50	
California Art Tile, A	7- 8-33	1½	3	
California Art Tile, B	3-18-33	....	¾	
Calaveras Cement, com	7-14-33	2	6	
Calaveras Cement, 7% pfd	7-14-33	45	....	1.75 qu. July 15, '33
Canada Cement, com	7- 3-33	8 actual sale		
Canada Cement, pfd	7- 3-33	38 actual sale		
Canada Cement 5½'s, 1947	7-18-33	80½	....	
Canada Crushed Stone bonds[42]	7- 6-33	72	....	
Canada Crushed Stone, com.[42]	7- 6-33	4	....	
Certainteed Products, com	7-17-33	6½	6⅝	
Certainteed Products, pfd	7-11-33	25	30	
Certainteed Products, 5½'s, 1948[46]	7-21-33	55⅜ actual sale		
Cleveland Quarries	7-19-33	....	25	
Consolidated Cement 1st 6½'s A[47]	7-20-33	6	8	
Consolidated Cement, pfd.[47]	7-20-33	1	2	
Consolidated Oka Sand and Gravel (Can.) 6½'s[12]	7- 8-33	No market		
Consolidated Oka Sand and Gravel (Can.) pfd.[42]	7- 8-33	No market		
Consolidated Rock Prod., com.[47]	7-20-33	50c	75c	
Consolidated Rock Prod., pfd.[47]	7-20-33	75c	1	
Consolidated Rock Prod., units[47]	7-20-33	1	2	
Consolidated S. & G. pfd. (Can.)	7- 8-33	30 (nominal)		
Construction Material, com.[47]	7-20-33	½	1	
Construction Material, pfd.[47]	7-20-33	2	3	
Consumers Rock and Gravel, 1st Mtg. 6's, 1948[47]	7-20-33	20	25	
Coosa P. C., 1st 6's[47]	7-20-33	20	25	
Coplay Cement Mfg., pfd.[47]	7-20-33	6	8	
Coplay Cement Mfg. 6's, 1941[47]	7-20-33	48	52	
Dewey P. C. com.[47]	7-20-33	50	75	
Dolese and Shepard	7-17-33	8	....	
Dufferin Pav. & Cr. Stone, com.	7-18-33	....	6	
Dufferin Pav. & Cr. Stone, pfd.	7-18-33	25	....	
Edison P. C. com.[47]	7-20-33	2	4	
Edison P. C. pfd.[47]	7-20-33	4	6	
Federal P. C. 6½'s, 1941[47]	7-20-33	60	65	
Giant Portland Cement, com.[47]	7-20-33	2	4	
Giant Portland Cement, pfd.[47]	7-20-33	5	7	
Gyp. Lime & Alabastine, Ltd.	7- 3-33	6¼ actual sale		
Gyp. Lime & Alabastine 5½'s, 1948	7-18-28	54	55¼	
Hermitage Cement, com.[47]	7-20-33	10	15	
Hermitage Cement, pfd.[47]	7-20-33	40	50	
Ideal Cement 5's, 1943[47]	7-20-33	86	90	
Ideal Cement, com.[47]	7-20-33	30	33	25c qu. July 1, '33
Indiana Limestone 6's[47]	7-20-33	18	21	
International Cem., com	7-20-33	36¼	36¾	
International Cem. bonds, 5's	7-15-33	83½ actual sale		Semi-ann. int.
Kelley Island L. & T.	7-19-33	13½	15	25c qu. Jan. 2, '33
Kentucky Cons. Stone, com.[47]	7-20-33	....	½	
Kentucky Cons. Stone, pfd.	6-18-33	....	10	
Kentucky Cons. Stone, 7% pfd.[47]	7-20-33	....	10	
Kentucky Cons. Stone, 1st Mtg., 6½'s[47]	7-15-33	15	20	
Kentucky Cons. Stone, V. T. C.[47]	7-20-33	No market		
Kentucky Rock Asphalt, com.	7-18-33	2	2½	
Kentucky Rock Asphalt, pfd.	7-18-33	11	....	
Kentucky Rock Asphalt 6½'s, 1935	7-18-33	53	55	
Lawrence P. C.	7-14-33	23	25½	
Lawrence P. C., 5½s, 1942[47]	7-20-33	50	54	
Lehigh P. C., com	7-20-33	22	23	
Lehigh P. C., pfd	7-11-33	75	85	87½c qu. July 1, '33
Louisville Cement[47]	7-20-33	50	60	
Lyman-Richey, 1st 6's, 1935[47]	7-20-33	80	85	
Marbelite Corp., com. (cement pts.)	7-15-33	5c	50c	
Marbelite Corp., pfd	7-15-33	25c	....	
Marquette Cement, com.[47]	7-20-33	7	10	
Marquette Cement, pfd.[47]	7-20-33	45	48	1.50 qu. Jan. 3, '33
Marquette Cement Mfg., 1st 5's, 1936[47]	7-20-33	65	70	
Marquette Cement Mfg., 1st 6's, 1936[40]	7-21-33	60 (nominal)		
Material Service Corp.[47]	7-20-33	5	7	
McGrady-Rodgers, 7% pfd.[47]	7-20-33	35	40	
McGrady-Rodgers, com.[47]	7-20-33	7	10	
Medusa P. C. com.[47]	7-20-33	12	50	
Medusa P. C. pfd.[47]	7-20-33	35	40	
Michigan L. and C., com.[47]	7-20-33	60	65	
Missouri Portland Cement	7-20-33	14	15	
Monarch Cement, com.[47]	7-20-33	50	60	
Monolith Portland Midwest[47]	7-20-33	½	1	
Monolith P. C., com.[47]	7-20-33	2	3	
Monolith P. C. pfd.[47]	7-20-33	3	5	
Monolith P. C. units[47]	7-20-33	4	7	
Monolith P. C. 1st Mtg. 6's[47]	7-20-33	60	65	
National Cem. (Can.) 1st 7's	7- 8-33	80 (nominal)		
National Gypsum A com	7-17-33	8	8¾	
National Gypsum pfd	7-17-33	61	....	1.75 qu. July 1, '33
National Gypsum, 6's[47]	7-20-33	75	78	
National L. & S. 6½'s, 1941[47]	7-20-33	65	70	
Nazareth Cement, com.[47]	7-20-33	3	5	
Nazareth Cement, pfd.[47]	7-20-33	15	20	
Newaygo Portland Cement, 1st 6½'s[47]	7-20-33	35	40	
New England Lime 6's, 1935[14]	7- 8-33	10 (nominal)		
New York Trap Rock 1st 6's, 1946	7-17-33	67 actual sale		
New York Trap Rock, 7% pfd.[47]	7-20-33	35	40	1.75 qu. Jan. 3, '33
North American Cement, 1st 6½'s[47]	7-20-33	10	12	
North American Cement, com.[47]	7-20-33	1	2	
North American Cement, 7% pfd.[47]	7-20-33	3	5	
North Shore Material, 1st 6's[47]	7-20-33	40	50	
Northwestern States P. C.[47]	7-20-33	31	34	
Ohio River S & G, com.[47]	7-20-33	2	4	
Ohio River S and G, 1st pfd.[47]	7-20-33	35	40	
Ohio River S and G, 2nd pfd.[47]	7-20-33	15	20	
Ohio River S and G, 6's[47]	7-20-33	40	50	
Oregon P. C. com.[47]	7-20-33	10	12	
Oregon P. C. pfd.[47]	7-20-33	70	75	
Pacific Coast Aggr. com.[40]	7-10-33	....	10c	
Pacific Coast Aggr. pfd.[40]	7-10-33	15c	30c	
Pacific Coast Aggr. 6½'s, 1944[5]	7- 8-33	22½	25	
Pacific Coast Aggr. 7's, 1939[5]	7- 8-33	2	4	
Pacific Coast Cement 6's, 1937[47]	7-20-33	41	43	
Pacific P. C. com	6-15-33	2½	3½	
Pacific P. C. pfd	6-15-33	22½	27½	
Pacific P. C. 6½'s pfd	7- 8-33	22¼	25	1.62½ qu. Jan. 5, '33
Pacific P. C. 6's, 1935[47]	7-20-33	87	90	
Peerless Cement, com.[47]	7-20-33	¼	¾	
Peerless Cement, pfd.[47]	7-20-33	2	3	
Penn-Dixie Cement, com	7-19-33	7½	8	
Penn-Dixie Cement, pfd	7-11-33	28	30	
Penn-Dixie Cement 6's	7-15-33	72 actual sale		
Penn. Glass Sand Corp., pfd.[47]	7-20-33	45	50	
Penn. Glass Sand Corp. 6's[47]	7-20-33	80	85	
Petoskey P. C. com	7-20-33	1¼	1¾	
Petoskey P. C. 6's, 1941	7-20-33	39	43	
Port Stockton Cement, com.[9]	7-8-33	No market		
Republic P. C. 6's, 1943	6-27-33	49	52	
Riverside Cement, A[47]	7-20-33	5	6	
Riverside Cement, B[47]	7-20-33	2	3	
Riverside Cement, pfd.[47]	7-20-33	55	60	1.50 qu. Aug. 1, '33
Rockland and Rockport Lime, 1st pfd.	7-20-33	2¼ actual sale		
Sandusky Cement 6's[47]	7-20-33	35	40	
Sandusky Cement 6½'s, 1932-37[47]	7-20-33	40	45	
Santa Cruz P. C. com.[47]	7-20-33	50	55	1.00 qu. July 1, '33
Schumacher Wallboard, com.[47]	7-20-33	1	2	
Schumacher Wallboard, pfd.[47]	7-20-33	3	5	
Signal Mt. P. C. pfd.[47]	7-20-33	10	15	
Southwestern P. C., units[47]	7-20-33	200	250	
Southwestern P. C. com.[47]	7-20-33	40	50	1.00 qu. Jan. 1, '33
Southwestern P. C. pfd.[47]	7-20-33	80	90	2.00 qu. Jan. 1, '33
Standard Paving and Material (Can.) com.[47]	7-20-33	2	5	
Standard Paving and Material, pfd.[47]	7-20-33	45	50	
Superior P. C., A[47]	7-20-33	35	40	27½c mo. May 1, '33
Superior P. C., B[47]	7-20-33	9	11	
Trinity P. C., units[47]	7-20-33	25	30	
Trinity P. C. com.[47]	7-20-33	5	10	
Trinity P. C. pfd.[47]	7-20-33	20	25	
U. S. Gypsum, com	7-20-33	50½	51¾	25c qu. July 1, '33
U. S. Gypsum pfd	7-20-33	118¾	119	1.75 qu. July 1, '33
Wabash P. C.[47]	7-20-33	5	6	
Warner Company, com.[47]	7-20-33	3	5	
Warner Company, 1st 7% pfd.[47]	7-20-33	20	25	
Warner Co. 6's, 1944, w. w.[47]	7-20-33	30	40	
Warner Company 6's, 1944, ex. w.	7-20-33	10	15	
Whitehall Cement Mfg. com.[47]	7-20-33	10	12	
Whitehall Cement Mfg. pfd.[47]	7-20-33	25	30	
Wisconsin L. and C., 1st 6's, 1933[47]	7-20-33	70	90	
Wisconsin L. and C., 6½'s[47]	7-20-33	70	90	
Wolverine P. C. com.[47]	7-20-33	2	3	
Yosemite P. C., A com.[47]	7-20-33	2	5	

Quotations by: [5]Smith, Camp & Riley, San Francisco, Calif. [9]A. E. White Co., San Francisco, Calif. [12]James Richardson & Sons, Ltd., Winnipeg, Man. [14]First Wisconsin Co., Milwaukee, Wis. [19]Hewitt, Ladin & Co., New York, N. Y. [37]Wise, Hobbs & Arnold, Boston. [40]Martin Judge, Jr., and Co., San Francisco, Calif. [42]Nesbitt, Thompson & Co., Toronto. [46]First Union Trust & Savings Bank, Chicago, Ill. [47]Anderson Plotz and Co., Chicago, Ill.

Recent Dividends Announced

Alpha Portland Cement Co., pfd. (qu.)	$1.75	June 15
Arundel Corp. (qu.)	.50	July 1
Calaveras Cement, 7% pfd. (qu.)	1.75	July 15
Ideal Cement Company (qu.)	.25	July 1
Lehigh P. C., pfd., accum. (qu.)	.87½	July 1
National Gypsum Co., 7% pfd. (qu.)	1.75	July 1
Riverside Cement Co., 6% 1st pfd. (qu..)	1.50	Aug. 1
Santa Cruz Portland Cement (qu.)	1.00	July 1
U. S. Gypsum, com. (qu.)	.25	July 1
U. S. Gypsum, pfd. (qu.)	1.75	July 1

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North American Cement Corp., New York, security holders have agreed to the financial reorganization published in ROCK PRODUCTS May 25, 1933, p. 35.

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Boston Sand and Gravel Co., Boston, Mass., reports for the years ended December 31, consolidated income account as follows:

	1932	1931
Gross earnings	$1,023,824	$1,292,790
Operating expenses and taxes	892,711	1,044,432
Depreciation	92,337	98,817
Depletion	8,328	16,148
Operating income	30,448	133,393
Interest	28,339	30,234
Net income	2,109	103,159
Preferred dividends	61,514	61,746
Common dividends	9,836	37,290
Surplus for year	(d) 69,241	4,123

No. of common shares, 49,180.

The last common stock dividend paid quarterly was $0.05, paid July 1, 1932; the last preferred dividend, $0.87½, quarterly, on January 3, 1933. As of December 31, 1933, current assets were $328,333, current liabilities $46,126; of the current assets $233,561 was in cash and securities, notes and accounts receivable $85,413.

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Marquette Cement Manufacturing Co., Chicago, Ill., reports a balance sheet for the years ending December 31, as follows:

Assets:	1932	1931
Property account	$18,654,757	$18,239,783
Current assets:		
Securities owned	336,758	1,197,446
Cash	676,584	829,402
Accounts and notes receivable	425,655	367,483
Inventories	1,418,967	1,630,279
Advances	3,210	4,325
Deferred charges	535,286	584,564
Prepayments	49,094	50,402
Total	$22,100,310	$22,903,684
Liabilities:		
6% preferred stock (par $100)	$ 3,888,900	$ 4,088,900
Common stock	3,443,200	3,443,200
1st 6s series to 1945	1,950,000	2,100,000
1st 5s series to 1940	1,530,000	1,645,000
Current Liabilities:		
Accounts payable	353,534	375,588
Reserve for taxes	67,279	65,812
Interest payable	51,041	54,585
Reserve for depreciation, depletion, etc.	6,626,681	5,754,036
Surplus	4,189,675	5,376,563
Total	$22,100,310	$22,903,684
Current assets	$ 2,861,173	$ 4,028,935
Current liabilities	471,855	495,985
Working capital	2,389,318	3,532,950

Calaveras Cement Co., San Francisco, Calif., reports for the years ended December 31:

	1932	1931
Operating profit	$186,521	$328,632
Other income	19,365	26,002
Total income	205,887	354,634
Selling administration and general expenses	148,911	193,936
Balance	56,976	160,698
Depreciation and depletion	111,524	109,510
Experimental work	9,593	25,402
Net income	(d)64,141	25,786
Preferred dividends	140,824	149,813
Deficit for year	204,965	124,026
Earned per share, common	(d)$1.64	(d)$0.99

Current assets as of December 31, 1932, were $919,989; current liabilities, $71,177; current assets included cash $314,610, certificates of deposit $125,000, U. S. Treasury certificates $65,000, notes and accounts receivable $128,419, inventories $286,960. No common dividends have been paid; preferred dividends have been paid regularly including $1.75 quarterly on July 15, 1933.

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Chemical Lime Co., Bellefonte, Penn., has informed security holders that it will be unable to meet bond interest payments due July 1. In addition there are bank loans due for substantial capital investments in new equipment. The first mortgage bond holders are asked to forego interest payments for three years, except as earned, and to permit priority of any new bank loans that may be necessary. The preferred stock holders are asked to waive the cumulative feature in dividends, except to the extent earned after payment of full interest on bonds.

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Trinity Portland Cement Co., Dallas, Tex., reports for the years ended December 31, 1932, the following balance sheet:

ASSETS

Cash		$ 173,199.89
Accounts and notes receivable less reserves for bad debts and discounts		400,915.35
Inventories		699,376.99
Deferred charges		14,714.19
Investments		67,179.02
Land, buildings and equipment at cost	$7,345,495.21	
Less reserve for depreciation	2,585,739.06	4,759,756.15
Goodwill		1,750,000.00
		$7,865,141.59

LIABILITIES

Notes payable		$ 697,152.00
Accounts payable		78,521.46
Accrued wages, interest, taxes, etc.		36,609.78
First mortgage 6% gold bonds		450,000.00
Other mortgages due serially to 1940		6,457.76
7% cumulative preferred stock	$1,750,000.00	
Common stock	1,500,000.00	
Surplus	3,346,400.59	
Total net worth		6,596,400.59
		$7,865,141.53

In a letter to stockholders President John L. Senior stated: "The year's operations of the company's three plants resulted in a loss of $290,951.69. Shipments were 878,596 bbl., representing 29.7% of the company's producing capacity, at a mill net of $1.238 per bbl. Of the loss as stated, $261,073.00 is depreciation."

Lawrence Portland Cement Co., New York City, at a special meeting of stockholders June 23, authorized the directors to change and convert the present capital stock of 100,000 shares of $100 par value to 100,000 shares without par value and to fix the stated capital of the company at $3,750,000, represented by 75,000 shares of stock without par value.

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Lehigh Portland Cement Co., Allentown, Penn., reports for the 12 months ended June 30, a net loss of $1,937,427 after taxes, depreciation, depletion and obsolescence, comparing with a net loss of $484,020 for the 12 months ended June 30, 1932. However, the 12 months' deficit per common share decreased in the second quarter of 1933 from $7.87 to $6.78.

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Republic Portland Cement Co., San Antonio, Tex., reports for the years ended December 31:

	1932	1931
Sales	$743,881	$1,209,143
Cost of sales	320,985	466,819
Expense, depletion, depreciation, etc.	289,425	437,773
Selling, general and other expenses	164,669	213,016
Net earnings	(d)31,198	91,534
Other income	13,306	9,663
Total income	(d)17,892	101,197
Bond interest	68,274	69,397
Miscellaneous charges	8,126	.....
Federal taxes, etc.	.....	4,301
Net income	(d)94,292	27,499
Preferred dividends	.....	76,206
Deficit for year	94,292	48,707
Earned per share, common.	(d)$0.68	(d)$0.20

Current assets as of December 31, 1932, were $310,961 and current liabilities $8,867; current assets included cash $138,611, accounts receivable $27,225, inventories $145,125. No common dividends have been paid; the last preferred stock dividend was $1.75 quarterly, December 1, 1931, making preferred dividends in arrears as of December 31 1932, $8.75 per share.

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Kelley Island Lime and Transport Co., Cleveland, Ohio, reports income account for the years ending December 31, as follows:

	1932	1931
Operating profit	(d)$ 4,588	$363,644
Depreciation and depletion.	75,762	147,241
Selling administration and general expenses	206,959	245,403
Operating loss	287,308	29,000
Other income	78,113	125,250
Total income	(d) 209,195	96,250
Federal taxes	.....	7,825
Other deductions	67,151	12,449
Net income	(d) 276,347	75,975
Dividends	308,952	579,285
Deficit for year	*585,299	503,310

*Before debiting adjustment of permanent assets by the management to eliminate obsolete items, etc., $894,223; reduction of inventory valuation to eliminate items which under current circumstances are considered unsalable by the management, etc., $253,436; total surplus debits, $1,147,659.

The deficit per share in 1932 was $0.89. Total assets as of December 31, 1932, were $9,210,733, against $11,069,699 on December 31, 1931. Current assets as of December 31, 1932, were $1,931,114; current liabilities, $233,065. Current assets included $813,006 in cash, $541,761 in United States securities at cost, $208,906 in notes and accounts receivable, and $347,440 in inventories. The last dividend paid was $0.25, quarterly, January 2, 1933.

Rock Products News Briefs

Recent Prices Bid

Crushed Stone: City of Gallipolis, Ohio, let contract to Miller Bros. for 400 cu. yd. of 1½-in. limestone at $1.40 per cu. yd.

Henry county, Ohio, has let contract to France Stone Co. for various highway jobs for crushed limestone at 90c to $1.25, delivered at eight destinations.

Sand and Gravel: Portland, Me., received bids on 6,600 cu. yd. of gravel as follows: Wm. P. McDonald, 63c per cu. yd.; Maine Sand and Gravel Co., 79½c; Hicks & Morrison, 72c; Joseph Mazziotto, 87c; George E. Densmore, 95c; Monitor Construction Co., 68c; Frank Vumbucca, 73c; John H. Simonds Co., 75c; Forgiono and Romane Co., 95c.

Albany, Wis.: N. S. Morris, contractor, has been awarded a contract for gravel, 2,600 cu. yd. at 40c on a road north of Oakley, south of Juda, and 1,500 cu. yd. for application around Jefferson township, at 20c, excepting haul, which is at 7c a mile. W. C. Ramsey, Attica, won the contract to gravel two and a half miles in Monroe township, on the Waelti road, 39c per cu. yd. of gravel placed on the road.

Fort Wayne, Ind.: Bids received on both sand and gravel on the basis of a ton unit prices, the offer made including the transportation cost from the company's source point to the point at which the material is to be used. The France Stone Co. offers, per ton, ranged from $1.49 to $1.98, while the Erie Stone Co. contracted to ship stone from its sources to points of usage at from $1.30 to $1.81 a ton. Gravel will be shipped and supplied by the Northern Indiana Sand Co. at from $1.49 to $1.86 a ton and by the Concrete Material Co. at $1.49. The county commissioners did not know how much material was to be needed in the work which is to be done, but they stated that the work would require at least 25,000 tons of material at the start.

Portland Cement: The going price of cement in California at present ranges around $2.20 f. o. b. mill in bulk and from $2.25 to $2.45 sacked, in carload lots. Less than carload offerings sacked run about $2.60 to $2.80. There has been no appreciable change in this market for several months, although expectancy is held that prices will be stiffened. Large bulk contracts such as those for the San Francisco bridges and the Metropolitan Water District in Los Angeles, are commanding considerable lower prices than the foregoing quotations.

Albuquerque, N. M.: All of the six bids submitted Wednesday to the Middle Rio Grande Conservancy district for supplying 35,000 bbl. of cement for delivery at points between Domingo and Socorro were the same. The bids ranged from $3.18 to $3.23, depending on the point of delivery, if supplied in paper sacks and from $3.45 to $3.48 if sent in cloth sacks. Bids were submitted by the Universal-Atlas Cement Co., Colorado Portland Cement Co., Lehigh Portland Cement Co., Monarch Cement Co, Monolith Portland Cement Co. and Southwestern Portland Cement Co.

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Sand and Gravel

Detroit, Mich.: Sand and gravel producers of Oakland, Macomb and Wayne counties announce a mutual selling organization. Designed to conform to the provisions of the National Recovery Act, it is said to be the first organization of its kind established in Michigan. Operating along lines that are now being successfully followed by Appalachian Coals, Inc., the organization will market the output of a number of competing producers who are members of the Tri-County Sand and Gravel Association. Quantity and quality of the material as well as the proximity of the pit to the particular job will determine the price in each case. Sales will be made through recognized dealers and material delivered direct from the pits to the customers. All billing and deliveries will be handled through a central office in Detroit. The Tri-County Sand and Gravel Association is a comparatively new organization. Its code of ethics is modeled after that of one of the most successful associations in the country. According to John G. Kemler of Rochester, president of the association and its selling organization, its membership is open to every sand and gravel producer in Oakland, Macomb and Wayne counties who is in accord with its purpose, namely, to co-operate with each other; to eliminate the evils of ignorant and ruinous competition; to make the relationship of the entire industry harmonious; to establish uniform trade practices and to eliminate trade abuses unfair to the producer and the customer.

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Independent Sand and Gravel Co., New York City, said to be composed of men formerly associated with the Goodwin-Gallagher Sand and Gravel Corp., which was recently taken over by the Colonial Sand and Gravel Co., has leased property at Port Washington, Long Island, and it is reported will erect a new plant.

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Rock Phosphate: Inquiries for Tennessee rock continue to grow little by little, but as yet nothing reaching boomlike proportions is in evidence. Demand for phosphate properties is still limited to speculators, but they always precede the actual investors, and it is significant that one large property which went begging for $15,000, sold at auction to the security holders, as previously reported, at $5,000, is now being offered to the public by a large investment house at several hundred thousand dollars, which price is still only ten per cent of the amount of an appraisal made a number of years ago. The death of Arthur J. Mason, of Homewood, Ill., which occurred at a Chicago hospital June 28, was a source of much sorrow to his numerous friends in the phosphate and fertilizer industries, in which he has had a prominent part for many years. He and his late partner, F. K. Hoover, were among the outstanding engineers of the country and most efficient labor-saving apparatus in several lines of industry, notably in iron and steel and phosphate bear testimony to their ingenuity and effective designing and constructing ability. Mr. Mason devoted most of the later years of a ripe old age to efforts to develop numerous matters designed to improve the condition of agriculture, and many of his ideas are sure to play a considerable part in the present trend of all industrial operations toward recognition of the absolute necessity of agricultural prosperity for any permanently prosperous condition of all. Only two weeks before his death, Mr. Mason had just completed and put in operation the latest designed plant for improving grade and increasing recovery of phosphate.

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Sand-Lime Brick Production and Shipments in June

THE FOLLOWING DATA are compiled from reports received direct from producers of sand-lime brick located in various parts of the United States and Canada. The accompanying statistics may be regarded as representative of the industry.

Twelve sand-lime brick plants reported for the month of June, this number being three less than the number reporting for the month of May, statistics for which were published June 25:

Average Prices for June

Shipping point	Plant price	Delivered
Medfield, Mass.	$ 8.00	$9.00-$10.00
Milwaukee, Wis.	7.50	10.50
Grand Rapids, Mich.	....	12.00
Madison, Wis.	12.50	13.50
Flint, Mich.	11.50	13.00
Saginaw, Mich.	10.00	....
Mishawaka, Ind.	8.50	....
Detroit, Mich.	....	10.50
Syracuse, N. Y.	18.00	20.00
Dayton, Ohio	9.00	11.00
Toronto, Ont., Can.	12.00	13.00

Statistics for May and June

	†May	*June
Production	587,535	730,000
Shipments (rail)	71,500	71,000
Shipments (truck)	605,610	1,264,580
Stocks on hand	3,876,987	1,935,965
Unfilled orders	1,580,000	1,315,000

†Fifteen plants reporting; incomplete, four not reporting unfilled orders.
*Twelve plants reporting; incomplete, five not reporting unfilled orders.

Concrete Pavement Yardage

AWARDS of concrete pavements for June and for the first six months of 1933, as reported by the Portland Cement Association, are as follows:

	Sq. Yd. Awarded During June, 1933	Total Sq. Yd. Awarded to Date, July 1, 1933
Roads	1,546,571	11,445,797
Streets	293,095	1,325,736
Alleys	21,158	84,430
Total	1,860,824	12,855,963

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Gypsum

Mathieson Alkali Co., New York City, has acquired the gypsum mines and plants of the Beaver Products Co. of Virginia, a subsidiary of the Certainteed Products Co., New York City. The gypsum property is close to the Saltville, Va., mines and plant of the Mathieson Alkali Co. A gypsum department of the Mathieson company has been created to operate and market the gypsum products. In addition, refuse of the gypsum mines will be utilized in the production of a new product to be manufactured, it is said, at the Saltville works.

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United States Gypsum Co. began the manufacture of wall board at its Blythe, or Midland, Calif., plant July 1. A crew was brought from the Sweetwater, Tex., plant. The wall board building is 40x500 ft., of concrete and steel construction. Other gypsum products are also made at this plant.

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The American Society for Testing Materials has submitted the following five specifications for gypsum and gypsum plasters to the American Standards Association for approval as American Standards under the proprietary sponsorship method: Gypsum (A. S. T. M. C22-25); Calcined Gypsum (A. S. T. M. C23-30); Gypsum Plasters (A. S. T. M. C28-30); Gypsum Molding Plaster (A. S. T. M. C59-30); Gypsum Pottery Plaster (A. S. T. M. C60-30).

These specifications were developed by A. S. T. M. Committee C-11 on Gypsum during the period of active study extending over several years prior to 1930. An examination of standards in the field of gypsum and gypsum plasters indicates that these particular specifications are either the only standards for these commodities or, in those cases where other standards have been found, it has been noted that technical requirements are practically identical with those given in the A. S. T. M. specifications. All of these standards are in current use in industry.

The specifications covering gypsum are used in the manufacture of portland cement, plate glass, wall plasters, structural products, and pottery. They are also applicable when gypsum is to be used as fertilizer. The specification for gypsum plasters has an extensive use in building construction, and this specification, as well as the specifications for gypsum and calcined gypsum, is referred to in building codes and ordinances on plastering. The specifications for gypsum molding plaster cover its use in ornamental work such as interior embellishments and cornices on walls and ceilings; also for staff work, plaster casts, etc. Gypsum pottery plaster is primarily used in the manufacture of molds of intricate design and outline such as used in the shaping of clay, terra cotta, and ceramic forms.

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General

Gasoline tax revenues in Illinois can be used only for road improvements, according to a permanent injunction against diversion recently granted by Circuit Judge L. E. Stone of Sangamon County. Despite wide public protest, gas tax funds were being used by many Illinois counties for unemployment relief. This decision holding diversion unconstitutional, it is believed, will now place the financing of a total of $33,000,000 in bond issues on property owners in several counties where unemployment relief bonds were issued against the gas tax money. This is the third decision which outlaws diversion of the gasoline taxes. In Minnesota and in Kentucky it has been ruled that gas tax allotments to counties cannot be diverted, stating they shall be used only for construction, improvement and maintenance of county-aid roads.

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E. J. Harding, managing director, Associated General Contractors of America, commenting on "What Control Means to the General Contractor," after expressing the opinion that the act has no legal basis, constitutional or otherwise, but will be upheld because it is an *emergency* measure, states: "It is of vital importance to understand this clear division between codes of fair competition and agreements between associations or industries. In practice it will mean that an association setting itself up as the representative of its industry must, before opening any negotiations with other trades and agencies, come into court with hands clean, so to speak, through having drafted a code to govern the acts of its own members. It means that before we as contractors can set out to reform the practices of anyone else in the industry we will have to wash away our own sins. * * * * No group is going to get away with any selfish advantage if the other associations and agencies in the industries seek to prevent it. Under this provision contractors will have a chance to force reforms upon surety companies, subcontractors, material men, labor, bankers, etc. * * * * Many unrelated and widely divergent practices treasured by individual contractors will be denied to them. The contractor will probably find that his manufacturing friends will sell at similar prices. Buying advantages will very likely become much narrower. * * * * Price fixing in such a competitive industry can have no place. Such contractors as have experience, skill and financial responsibility may still bid on a job below cost and lose. Mistakes in estimating may still happen. Contingencies may still arise on contracts. These are the normal risks which a contractor with skill, integrity and responsibility expects to run. But the malpractices, the irresponsible competitor, the low bid based on a plan to buy cheap, cut wages or to evade payment for services or materials, can be eliminated. With that elimination the contractor can tender his bids on known factors of ethical competition and can compete on the basis of his actual efficiency in management and production.

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Ohio Stone Group Sues U. S.

THE United States, the Interstate Commerce Commission and nine railroad companies are named defendants in the stone-rate suit now pending before the U. S. district court in Toledo, with seven western Ohio stone and quarry companies acting jointly as plaintiff.

Discrimination in favor of Michigan and Indiana shippers is charged in the brief which seeks to have the court set aside the I. C. C. order of June 1, by which all intrastate rates on Ohio crushed stone and slag were raised. The commission's order originated from protests on the part of West Virginia and western Pennsylvania shippers who claimed the low Ohio rates barred them from competition on road building contracts. Firms joining in the suit are Delphos Quarries Co., Ohio Blue Limestone Co., Herzog Lime and Stone Co., Lima Stone Co., Tarbox Stone Co., McCall Stone Co., and the Ohio Marble Co. Their counsel maintains that the low interstate rates, in comparison with the new intrastate schedule, give Michigan and Indiana operators undue advantage.

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Renew Rate Cut Debate

REPRESENTATIVES of shippers and counsel for railroads began the final phase of the general rate reduction hearing before the entire bench of the Interstate Commerce Commission in Washington, D. C., June 26. The discussion was prefaced by remarks of J. E. Benton, general counsel for rail interests, who disparaged the value of the new set of "rebuttal" briefs offered by shippers in the long-drawn out docket case No. 26000.

Deflation of the dollar already has reduced rail rates 20%, according to railroad spokesmen who cited uncontrolled motor truck traffic and rates as unfair competition.

Shippers, in some cases asking a blanket reduction of 25%, maintained that lower rates would restore lost volume to rails and make such an order by the commission mutually profitable.

TRAFFIC and TRANSPORTATION

Proposed Rate Changes

THE FOLLOWING are the latest proposed changes in freight rates up to the week ending July 15:

New England

30019. **Common sand and gravel,** minimum weight 50 net tons of 2,000 lb. from Littleton and Bedford, Mass., to Boston, Cambridge, Somerville and W. Cambridge, Mass.; from Gleasondale, Maynard, South Action, Topsfield, Wayland and W. Concord, Mass., to Belmont, Boston, Cambridge, Somerville, Waltham, Waverley and W. Cambridge, Mass.; and from Gleasondale and Lancaster, Mass., to Worcester, Mass. Present, 45; proposed, 40 net ton (to expire with September 30, 1933); 45 to become effective October 1, 1933).

30026. **Ground agricultural stone,** from Byron and Houghton, Me., to Greenville, Me. Present, 23; proposed, 22½.

30188. Cancel rate of 95c per ton on **stone,** broken or crushed, etc., from all origins named in H. R. R. I. C. C. F–572, 596 and 619, to all destinations named in same tariff. Reason: Cancel obsolete rates.

29946. **Sand,** core (See Note 2), from Davisville, R. I., to Bethlehem, Pa. Present, 24; proposed, 18½. Reason: Same rate as currently effective to other trunk line destinations.

31012. (A) **Building lime,** C. L., minimum weight 30,000 lb. (B) **Agricultural, land, chemical, gas or glass lime,** C. L., minimum weight 30,000 lb., and **ground limestone,** C. L., minimum weight 50,000 lb. from Annville, Brownstone, Myerstown, Harrisburg, Hummelstown, Lancaster, Lebanon, Palmyra and Swatara, Pa., to Secaucus to Fox Hill, N. J.; Roseville Ave. to Montclair, N. J.; East Orange to Summit, N. J., and Chatham to Wharton, N. J. (A) 14½c, and (B) 14c per 100 lb.

31018. **Stone, viz., crushed, screenings** (including crushed limestone and limestone screenings), in straight or mixed carloads, in open top cars (See Note 2), from P. & L. E. R. R. Branchton group stations, viz., Annandale, Branchton and Harrisville, Pa., to Starford, Pa., $1.60 per net ton plus emergency charge.

Trunk Line

31144. To establish switching charge of 25c per net ton, subject to minimum charge of $10 per car, on **crushed stone,** C. L., at Reading, Pa., in lieu of present commodity rate of 60 per net ton published in Rdg. Co. I. C. C. No. 1161 subject to emergency charge.

31146. **Sand, blast, core, engine, fire, foundry, glass, moulding, quartz, silez or silica,** in straight or mixed carloads (See Note 2), from Emlenton and Foxburg, Pa., to Knox, Pa., $1.01 per net ton. (Present rate $1.26 per net ton.)

31148. To cancel all rates on **ganister stone** from Pond Hill, Pa., and Loyalsock, Pa., to points of destination shown in P. R. R., I. C. C. 216.

31153. **Ground limestone,** C. L., minimum weight 60,000 lb. from Blakeslee, N. Y., to N. Y. O. & W. Ry. stations: Cornwall, Wurtsboro, East Branch, Walton, New Berlin Jct., Oxford, Solsville, Rome, Valley Mills, Sylvan Beach, Central Square, Oswego, N. Y., and various. Rates ranging from 95c to $2.10 per net ton.

31156. To establish rate of $4 per net ton on **ground feldspar,** C. L., minimum weight, 60,000 lb., from Brookneal, Va., to York, Pa.

31096. **Limestone, unburned, ground,** C. L., minimum weight 50,000 lb., from Buffalo, N. Y., to C. & P. A., Erie and B. & O. R. R. points, Roulette, Newfield, Galeton, Wharton, Mill Creek, Covington, Arnot, Hoytville and various. Rates ranging from $1.60 to $1.95 per net ton.

31112. **Crushed stone** (plain), C. L., from Leroy, N. Y., to Prattsburgh, N. Y., $1.20 per net ton. (Present rate, $1.40 per net ton.)

31118. **Sand,** in open cars, C. L. (See Note 2), from Lewes, Del., to Best, Pa., $2.30 per net ton. (Present rate, $2.5i per net ton.)

31119. **Sand,** in open top cars (See Note 2), from Lewes, Del., to Linfield, Pa., $1.90 per net ton. (Present rate, $2.05.)

31124. (A) **Building lime,** C. L., minimum weight 30,000 lb.; (B) **agricultural land, chemical, gas and glass lime,** C. L., minimum weight 30,000 ib., also **ground limestone,** C. L., minimum weight 50,000 lb., from Bellefonte, Pleasant Gap and Chemical, Pa., to Hillsdale, N. Y.; (A) 24½c and (B) 24c per 100 lb.

31126. (A) **Sand, blast, engine, foundry, moulding, glass, silica, quartz or silex,** C. L., and (B) **sand, other than blast, engine, foundry, moulding, glass, silica, quartz or silex,** C. L. (See Note 2), from Lewes, Del., to Sykesville, Md. (A) $2.80 and (B) $2.60 per net ton.

Central

36218. To cancel all rates on **sand and gravel,** C. L., from Atlantic, Pa., Canfield, Hubbard, Marquis, Niles, Ohio, Sharon, Sharpsville, Pa., and Youngstown, O., to points in states of Illinois, Indiana, Iowa, Kentucky, Michigan, Missouri, New York, Ohio, Pennsylvania, West Virginia and Wisconsin, named in Erie R. R. Tariff No. 104–I, except on refuse material (burnt or refuse sand), from Sharon, Pa., to Cleveland, O.

36248. To cancel all rates on **ganister stone,** C. L., from Berea, Columbia, West View and Cleveland, O., to all points of destination, published on pages 11 to 44 of C. C. C. & St. L. Ry., Tariff 1733–I, and as amended, located in states of Illinois, Indiana, Michigan, Ohio, Pennsylvania, West Virginia, New York, etc., also to cancel rate of $2.05 on crude ganister rock, C. L., from Cleveland, O., to Pittsburgh, Pa., applicable on ex–lake traffic published in Item 28585 of C. C. C. & St. L. Ry. Tariff 525–O, allowing classification basis to apply, account no movement of ganister stone or rock from and to the points in question.

31073. To cancel rates on **sand and gravel,** from the various points of origin and tariffs as enumerated below: I. C. C. 75, sand, from Mocanaqua, Kapp, Watsontown to Loyalsock, Jersey Shore, Paxinos, Canton, Pa., and Phelps Jct., N. Y.

I. C. C. 165, Metuchen, N. J., Edgely, Stover and Wheatfield, Pa.

I. C. C. 165, sand, Metuchen, N. J., Edgely, Croyden, Eddington, Cornwell Heights, Pa., Trenton, Hightstown, Florence, Riverside, Arch St. Palmyra to Pavonia, Camden, Browns Mills, Whitings, Crossley, Pine Beach and Seaside Park, N. J.

I. C. C. 284, gravel, Moore, Lambertville, Jamesburg, Dayton, Farmingdale to Allenwood, Yardville, Bordentown, Fieldsboro, Wilkins, Medford, Evansville, Ocean Gate, Penns Grove, Quinton, Salem, Glassboro, Pleasantville, Somers Point, Avalon, Peermont, Stone Harbor, Wildwood Crest, Collingswood, Marlton, Pomona, Absecon, Atlantic City, Camden, N. J., Whiteford to Narvon, Rohrerstown to Elizabethtown, Middletown, Spring Mill, Pa., Arbutus, Stony Run, Harmon, Severn, Odenton, Marlboro, Croome, Osborne, Lanham, Md., Benning, D. C., Texas, Cockeysville, Ashland, Phoenix, Corbett, Monkton, Md., Shrewsbury and Spring Grove, Pa.

I. C. C. 284, gravel, Iron Ridge, Hanover, Pa., Frederick, Md., Rockburn, Hellam, Stoner, Wrightsville, Emigsville, Mt. Wolf, Shippensburg, Fayetteville, East Fayetteville, Pond Bank, Mont Alto, Pa., Crisfield, Pocomoke, Md., South Camden, Coopers Pt., Camden and City Line, N. J.

I. C. C. 284, sand, Thompson, Christiana to Herrville, Refton to Quarryville, Long Park, Conewago, Sidley, Spring City to Royersford, Ridgewood to North Reading, Five Locks, Pa., Mt. Washington, Md., Lemoyne, Dillsburg, Quincy, Waynesboro, Geiser, Pa., Powells Bend, Md., Falling Waters, W. Va., Winchester, Va., Salisbury, Md., and Mt. Vernon to Lebanon, Pa.

I. C. C. 284, wall sand, New York and Brooklyn stations, Jersey City, to Manhattan Piers, Newark to Greenville Piers and Perth Amboy, N. J.

G. O., I. C. C. 14860, sand and gravel, Chester Stas., Pa., Newport, Stanton, Cooch, Audenried, Keeney, Del., Newark, Del., to End Elkton Middletown Br., Md., Bacon Hill, Principio, Perryville, Port Deposit, Stemmers Run, Md., New Castle, Bear, Rehoboth, Del., Berlin, Md., and Seaford, Del.

Reason: Investigation develops no traffic has moved for some time nor is there prospects for future shipments, therefore rates are obsolete.

36290. To establish on **rip rap** (small size) and **waste stone,** C. L., from the Bedford-Bloomington, Ind., district to Indianapolis, Ind., rate of 90c per N. T. plus emergency charge via the C. I. & L. Ry., Bloomington, Ind., I. C. R. R. Present, 140c and 153c per N. T. depending on the route of movement.

36313. (1) To establish on **stone,** furnace or foundry, melting and/or refractory (unburned) in bulk, in open top equipment, C. L. (See Note 3). Rates in cents per G. T.

FROM NORTHWESTERN, OHIO

To	Group 1 Present	Group 1 Proposed
Ashland, Ky.	166	138
Portsmouth, Ohio.	166	138
Ironton, Ohio.	166	138

FROM MARBLE CLIFF, OHIO

To	Present	Proposed
Ashland, Ky.	101	84
Portsmouth, Ohio.	101	84
Ironton, Ohio.	101	84

36314. (2) To establish on **barytes,** crude, lump, jugged or crushed, C. L., minimum weight 10 per cent less than the marked capacity of car, from (B) St. Louis, Mo., or E. St. Louis, Ill. (proportional).

To	Present Cents	A Proposed Cents
Huntington, W. Va.	30	365
Fairmont, W. Va.	545	430
Charleston, W. Va.	32	400
Wheeling, W. Va.	(3)545	405
Parkersburg, W. Va.	(4)545	390
Clarksburg, W. Va.	(4)545	430
Morgantown, W. Va.	35	430
Pittsburgh, Pa.	545	430
Washington, Pa.	(3)545	430
Steubenville, O.	33	405
Zanesville, O.	(3)545	365
Columbus, O.	28	345
Willoughby, O.	32	400
Martins Ferry, O.	(3)545	405
Crooksville, O.	30	365
Newark, O.	(3)545	360
Toledo, O.	29	350
Cincinnati, O.	25	310
Cleveland, O.	32	390
Muncie, Ind.	24	295
Gas City, Ind.	24	300
Indianapolis, Ind.	22	265
Detroit, Mich.	30	365
Lancaster, N. Y.	37	450
Camden, N. J.	44	540
Bridgeton, N. J.	657	560
Newark, N. J.	66	560
Graselli, N. J.	66	560
New York, N. Y.	66	560
Lancaster, Pa.	545	515
Palmerton, Pa.	545	515
Philadelphia, Pa.	64	540
Aquashicola, Pa.	545	515
Newport, Del.	545	540
Wilmington, Del.	545	540
Baltimore, Md.	545	515
St. Helena, Md.	61	515
Anderson, Ind.	23	285

(3) Pittsburgh, Pa., rate under intermediate rule.

(4) Fairmont, W. Va., rate under intermediate rule.

(A) Rate in cents per ton of 2,240 lb.

(B) Applies only when the rate to St. Louis, Mo., is lower than the rate to E. St. Louis, Ill.

36316. To establish on **stone,** broken; **rip rap, rubble, quarry scrap, rough spawls,** C. L., from Annandale, Goff and Hilliards, Pa., to Pittsburgh, Pa., rate of 113c plus emergency charge (same as rate from Neshannock Falls, Pa.) Routing—Via Butler, Pa. Present, 126c per N. T.

36467. To establish on **sand** (except blast, core, engine, filter, fire or furnace, glass, grinding or polishing, loam, moulding or silica) and **gravel,** carload, from Jonesville, Mich., to Albion, Mich., rate of 40c per net ton plus emergency charge.

36468. To establish on **lake and beach sand,** C. L., from Ludington and Manistee, Mich., to Port Huron, Mich., rate of 101c per net ton. (Includes emergency charge.)

36485. To establish on **burnt or refuse foundry sand,** C. L., from Meadville, Pa., to Erie Pa., rates of 90c in open top cars and 104c per N. T. in box cars, plus emergency charge shown in C. F. A. L. Tariff I. C. C. 2526.

36487. To establish on **refuse or spent grinding sand,** C. L., from Butler, Pa., to Erie, Pa., rates of 110c in open top cars and 127c per N. T. in box cars, plus emergency charge.

36491. To establish on **sand,** viz.: Lake, river and bank, other than sand loam, C. L.,

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

to Saginaw, Mich., from Gary, Calumet, Crocker and Willow Creek, Ind., rate of 151c per N. T., plus emergency charge. Routes: via Wab. Ry., Detroit, Mich.; G. T. Ry. or via Wab. Ry., Detroit, Mich.; P. M. R. R.

Southwestern

1262. **Amiesite, crushed stone or chatts,** from Iantha, Liberal and Lamar, Mo., to stations in Iowa, Kansas, Missouri and Nebraska. That rates published from Iantha, Liberal and Lamar, Mo., in St. L.-S. F. Ry. Tariff 703K and Mo. Pac. R. R. Tariff 1464-I, on bituminous asphalt rock, be also applied to amiesite, crushed stone or chatts coated with oil, tar or asphaltum, C. L. (See Note 1), but not less than 50,000 lb. except when car is loaded to full visible or space carrying capacity, in which case actual weight will govern. It is contended that rates on amiesite should not exceed those on bituminous asphalt rock.

1285. **River sand,** from points in Missouri to Memphis, Tenn., and Jefferson Barracks, Mo. To amend Items 2250 and 2260 of W. T. L. Tariff 33-K, to specifically provide for the application of the rates shown therein on "sand" to apply "river sand." No change to be made on gravel.

Southern

1856. **Bituminous rock,** crushed or ground, C. L., Big Clifty, Black Rock, Rockport, and Summit, Ky., to New Orleans, La. (proper). Present rate, $4.30. Proposed rate on bituminous rock, crushed or ground, C. L., minimum weight 80,000 lb., as described in Item 200 of Agent Speiden's Tariff No. 196-C. I. C. C. No. 1575 from and to above named points, $3.50 per net ton.

1975. **Mica,** dry ground, C. L., and **mica schist,** dry ground and/or screened, C. L., Kings Creek, S. C., to points in Central, Illinois, New England Freight and Trunk Line Association territories. It is proposed to establish rates on mica, dry ground, C. L., minimum weight 50,000 lb.; mica schist, dry ground and/or screened, carload, minimum weight 60,000 lb. from and to the above named points in line with rates currently in effect from Biltmore and Spruce Pine, N. C.

1977. **Mica,** scrap or waste, crude, C. L., Fero, Thermal City, Tate, Logan, Bostic and Forest City, N. C., to Rutherford, N. J., and Forest Park, Ill. At present, class rates apply. It is proposed to establish rates on mica, scrap or waste, crude, C. L. minimum weight 60,000 lb. from Fero and Thermal City, N. C., to Rutherford, N. J., 30c; Forest Park, Ill., 33c. From Tate, Logan, Bostic and Forest City, N. C., to Rutherford, N. J., 30c; Forest Park, Ill., 34c per 100 lb.

Texas-Louisiana

S-8462-TX. (Proposal 814-TX.) **Stone,** crushing in transit in P. C. S. weighing 200 lb. or less, C. L., from Llano, Burnet and Marble Falls, to Austin, for crushing and reforwarding to state and interstate points. Proposition to amend T. & N. O. Ind. Tariff 974-B, by adding Llano, Burnet and Marble Falls as origin points named in Item 20, the result of which will be to establish crushing privileges to the same extent as now applicable on stone originating at Sudduth, Texas.

S-9019-TX. **Sand and gravel,** C. L., from Dorothy, Tex., to industry or team tracks also transfer tracks with connections of C. R. I. & G. Ry. at Ft. Worth, Tex. Proposition to establish rate of $18 per car to industry or team tracks of C. R. I. & G. Ry. rate of $17.50 to transfer tracks with connections of C. R. I. & G. Ry. at Ft. Worth. Both rates to be subject to Notes A and B of Item 7600, Texas Lines' Tariff 2-L.

S-9020-TX. **Sulphur and brimstone,** C. L., originating at Bryanmound and Hoskins, transit privileges for purpose of crushing at Freeport. For reshipment to points in Texas. Proposition to establish transit privileges for the purpose of crushing (not ground or refined with reshipment in bulk) on sulphur and brimstone, at Freeport, Texas, shipments to originate at Bryanmound or Hoskins. Reshipments to be made to Texas destinations to the same extent that the privilege is available on interstate traffic.

Shippers request the same transit arrangement on intrastate traffic as in effect on interstate traffic.

Illinois

36330. To establish on **sand,** blast, core, engine, fire, foundry, moulding, quartz, silex or silica, in straight or mixed carloads, from Emlenton and Foxburg, Pa., to Knox, Pa., rate of 101c per net ton, plus emergency charge. Present rate, 126c per net ton, plus emergency charge.

36339. To establish on **limestone, agricultural** or **marl,** agricultural (ground or natural marl), C. L., minimum weight 50,000 lb., from Lakeville, O., to destination territory defined in Item 1610 of C. F. A. L. Exceptions Tariff 130-U, viz., points in C. F. A., Trunk Line Arbitrary and Canadian Freight Association territories, rates as shown in Item 1610 referred to above, viz., 60% of sixth class.

36391. To establish on **crushed stone,** C. L., from Lima, O., to Sidney, O., rate of 50c per net ton. Present rate, 60c.

7393. **Stone, crushed,** C. L. (See Note 3), from Menard, Ill. Rates per net ton.

To (rep. pts.)	Proposed
Alhambra, Ill.	$1.03
Charleston, Ill.	1.26
Donnellson, Ill.	1.13
Farina, Ill.	1.08
Mont, Ill.	.98
Newton, Ill.	1.20
Wood River, Ill.	.98
Columbia, Ill.	.85

7401. **Shale,** C. L., minimum weight 80,000 lb., from Dayton, Ill., to Chicago, Ill. Rates per net ton, present, $1.40; proposed, $1.05.

Western

7270-D. **Stone,** crushed, etc., C. L., as described in Item 2420-B of W. T. L. Tariff 6-R, from Red Granite, Ablemans, Wis., and other Wisconsin points shown in Item 2420-B, W. T. L. Tariff 6-R, to Keokuk, Ia. Rates: Present—11c per 100 lb. Proposed—10c per 100 lb.

1665-D. Rates: **Stone,** crushed or ground; **chatts** (lead or zinc mine refuse); **rip rap; rubble stone; strippings** (stone), sand, gravel; **strippings** (sand or gravel pit), C. L., (See Note 3), but not less than 40,000 lb., will apply between Hannibal, Mo., and stations in Iowa. Rates: Present—As shown in Item 2197-C of Sup 172 to Agent Boyd's Freight Tariff No. 50-N. For example, the rate from Hannibal to Des Moines under this item is $2.50 per net ton. Proposed—Alternative distance rates shown in Item No. 7805-F of Sup. 172 of Agent Boyd's Tariff No. 50-N. Under this item the rate from Hannibal to Des Moines (via Wabash 262 miles) is $2 per net ton. (By shipper.)

1873-Q. Rates: **Stone,** crushed, C. L. (See Note 3), from Moline, Kan., to Wichita, Kan. Rates: Present—95c per net ton. Proposed—77c per net ton.

6962-C. Rates, cancellation of emergency charge, **Limestone,** agricultural, C. L., from Dubuque, Ia., to stations in Illinois, Wisconsin and Minnesota. Rates, present, rates subject to application of emergency charges, W. T. L. Tariff 252-A. Proposed, cancel application of emergency charge.

2898-K. Rates, **sand** and **gravel,** C. L. (See Note 3), but not less than 40,000 lb., from points in Minnesota, to points in Iowa. Rates, present, on varying scales. Proposed (rates in cents per ton of 2,000 lb.):

Distance	Single Line
40 miles and under	75
50 miles and over 40	80
60 miles and over 50	85
65 miles and over 60	91
70 miles and over 65	94
75 miles and over 70	97
80 miles and over 75	100
85 miles and over 80	104
90 miles and over 85	106
95 miles and over 90	109
100 miles and over 95	113
105 miles and over 100	115
110 miles and over 105	117
115 miles and over 110	119
120 miles and over 115	122
125 miles and over 120	124
130 miles and over 125	126
135 miles and over 130	128
140 miles and over 135	131
145 miles and over 140	133
150 miles and over 145	135
155 miles and over 150	137
160 miles and over 155	140

(By shipper.)

6025-J. Rates and minimum weight: **Limestone,** ground, in barrels or sacks, C. L. From Valmeyer, Ill., to Colorado common points. Rates: Present, 642c per net ton, plus emergency charge (Dupo, Ill., combination); proposed 680c plus emergency charge. Minimum weight, present (See Note 2); proposed, 60,000 lb.

8540. Rates: **Rock,** asphalt, natural or coated, with not to exceed 5% of road oil, crushed or ground; **stone,** coated with not to exceed 5% of road oil, crushed or ground: straight or mixed carloads (See Note 1), but not less than 50,000 lb. From Cline, Blewett, Dabney, LaPryor, Pulliam and Whitesboro, Texas, to Fremont, Neb. Rates: Present, class rates; proposed, 550c per ton of 2,000 lb.

7844-2. **Sand, silica,** C. L. (See Note 3), but not less than 40,000 lb., from Pacific, Mo., to Alton, Ill. Rates, present 120c per net ton. Proposed, 82c per net ton. Present and proposed rate subject to emergency charge.

Sup. 1 to 5319-F. **Sand, gravel** or **stone,** crushed, carload, minimum weight as shown in Item No. 5 of C. B. & Q. R. R. Tariff G. F. O. No. 16830-C. I. C. C. No. 17922, between stations in Nebraska.

Sup. 1 to 7844-2. Rates, **silica** (white sand), including ground silica, straight or mixed C. L. (See Note 3), but not less than 40,000 lb., from Gray Summitt and Pacific, Mo., to Alton, Ill. Rates, present, 121½c per net ton, plus emergency charge. Proposed, 82c plus emergency charge.

I. C. C. Decisions

25135. Crushed Stone. Supplemental report by the commission on increases in intrastate freight rates and charges, part 13, West Virginia. Prior report, 191 I. C. C. 351, and order requiring maintenance on intrastate commerce in West Virginia of rates not lower than those then in force, plus surcharges corresponding to the surcharges maintained on interstate traffic, modified to except therefrom the intrastate transportation of crushed stone from Greer to Moundsville, W. Va., and points intermediate thereto, so as to enable the B. & O. to establish a rate of 80c a net ton to meet truck competition. But for this exception a rate of $1 a ton would be applicable. An order reopening this case was issued coincidentally with this supplemental report.

13425. Cement. Supplemental report on cement in trunk line territory by division 3. Relief from the long and short haul provision of section 4 in rates on cement from points in Maryland, New Jersey, New York, Pennsylvania, Virginia and West Virginia to destinations in trunk line territory and points adjacent thereto, and in the 60% group of central territory, authorized in 174 I. C. C. 224, modified to include cement mixture in mixed carloads with cement, by means of twelfth supplemental fourth section order No. 10599.

14186. Lime, Limestone and Marl. Fourth Section. By division 2. By fourth section order No. 11280, authority granted, on conditions, to establish and maintain rates on lime and ground or pulverized limestone and marl, points in Maryland, Virginia and West Virginia to destinations in Virginia, without observing the long-and-short haul provision of section 4. Rates from, to and between the higher rated intermediate points shall not exceed rates on the basis prescribed in North American Cement Corporation vs. A. & R., 153 I. C. C. 431, 163 I. C. C. 701. Circuity limitations imposed.

25356. Cement. Signal Mountain Portland Cement Co. vs. Alcolu et al. By division 3. Dismissed. Rates, cement, Chattanooga, Tenn., to destinations in the Carolinas, not unreasonable or otherwise unlawful.

3742 and 3776. Lime. Readjustment of rates lime (calcium or magnesium) common hydrated, quick or slaked, and agricultural and fluxing lime from, to and between the southwest. By division 5. Proposal to make new rates on the conditional basis of column 17.5 of the southwestern scale found not justified. Suggested scale provides for rates on hauls up to 2,000 miles. Maintenance of present grouping of origin points recommended with exceptions applicable on the basis of a suggested initial rate of 8c. for five miles and less, graduating (with differentials allowed) to 40c. for 2,000 miles.

American Society for Testing Materials

Papers and Committee Reports on Rock Products Presented at Recent Chicago Meeting Reported by F. O. Anderegg

IN HIS PAPER, "Permeability of Brick Masonry Walls," Prof. W. C. Voss, of the Massachusetts Institute of Technology, Cambridge, Mass., limited himself in the discussion to the factor of the materials, including the brick, the mortar and their assemblages; and still further restricted himself to four types of brick with three mortars containing varying amounts of portland cement and high calcium lime, the latter used both as dry hydrate and as putty, and a single sand. The brick, which included a dry-press shale face brick, a wire-cut shale face brick and two common brick, the one sand-struck and the other water-struck, were studied in detail in regard to the absorption characteristics at different intervals of contact with water by complete immersion, or in contact with water on one side, or with mortar applied to one side.

The variables considered in making up test specimens included: specific-mass gravity of the brick, percentage of total absorbed water in the brick, thickness of joint, load in joint, method of curing and treatment, type and age of specimen. He then discussed the important question of an effective "bond layer," to secure which, obviously, the brick and mortar must start out in intimate contact. Following the contact, moisture starts to move toward the brick and the rate of this flow determines the effectiveness of the development of the bond layer; if too rapid, the cement at the interface is granulated, due to insufficient moisture for hydration and curing; while if too slow, a moisture film forms over the surface of the brick which distends the cement, weakening it seriously. If an attempt is made to wet the brick before laying, Prof. Voss believes that the regularity of absorption may be so impaired as to "destroy the homogeneity of the wall."

Lime Recommended in All Brick Mortars

It was regarded as of importance that the mortar should remain sufficiently "live" to react with alternate wetting and drying so as to carry on a more or less continuous building up of the bond layer and for this purpose the Professor believes lime as hydrate or carbonate to be essential to allow dissolution and recrystallization at the interface to build up and heal slight ruptures produced by differential shrinkages. This viewpoint was used in discussing the several photomicrographs reproduced of brick-mortar interfaces.

Attention was called to a series of "outstanding indications (not inclusions)" drawn from the investigation: (1) Brick and mortar characteristics considered separately will yield no criterion for a permeable bond. (2) All brick will not react favorably with all mortars; each needs its proper mortar. (3) Uniformity of brick structure is indispensable in selecting the proper mortar. (4) "It is absolutely essential that a brick possess from 5 to 10% total absorption, by immersion for 48 hours, and that its rate after 5 or 10 min. be uniform and gradual for several hours." (5) Absorption tests are more reliable than strength tests for face brick quality. (6) Mechanical bonds produced by wire-cutting, frogs, etc., have little effect on adhesion. (7) Neither mortar nor brick should be too dense. (8) Cement and lime should both be present in mortar. (9) Highly absorbent brick require much lime; whereas brick with about 5% absorption might best be laid in mortar containing equal parts of cement and lime. (10) Very dense brick should be laid in high lime mortars. (11) Loaded walls are more watertight than curtain walls; intimate contact is advantageous. Thin joints are more effective than thick joints.

Based on these points, Prof. Voss offers the following hypothesis: "A leakless brick masonry wall may be produced by an assemblage of brick and mortar where, first, the relation of the absorptive power of the brick to the amount of water in the mortar is such that an initial movement toward the brick plane sets in early and continues at an even rate for several hours; and where, second, the mortar is so constituted as to permit such loss of water and still provide a soluble product, which in the process is concentrated at the brick plane and is available thereafter for a long period of time to form the compound with a minimum of differential shrinkage with the brick, the assemblage being capable by its porous structure to permit repetition of such action."

California Earthquake Conclusions

Prof. Raymond E. Davis reported to Committee C-12 his observations on the "Effect of the Southern California Earthquake upon Buildings of Unit Masonry Construction." The primary cause of failure in masonry walls was ascribed to mortar deficient in cementing power. Mortars made by mixing "carbide sludge" with six or more parts of sand were of such a character as to crumble readily between the fingers. Some of the buildings that tumbled down were also apparently faulty in design, with insufficient tying together of the different parts of the building, according to the survey.

P. H. Bates on Cement

One of the most interesting papers presented in the session on cement was written by P. H. Bates, who, taking advantage of the perspective afforded by his long contact with the industry while in charge of the cement activities at the Bureau of Standards, delivered a characteristically penetrating and suggestive discourse on "The Status of Specifications for Hydraulic Cements in the United States." The great variety of uses to which portland cement has been put are considered and the question is raised as to whether portland cement has the best combination of properties to give best possible service in each application. The qualities which will give highest quality service for road work are probably not the same as will be most satisfactory for mass concrete; while for best reinforced concrete another set will probably be more desirable. Already in the field of masonry considerable variation from straight portland cement mortars are in general use. Then the resistance to corrosive waters is still a very much open question. Mr. Bates feels that a variety of cements may well be developed so as to give better service for different purposes.

He points out the inadequacy of our present knowledge of cement and just what combination of properties will give best service under special conditions remains largely to be worked out. He takes his usual dig at the inadequacy of present standard specifications and definitions for cement.

He ends by quoting from a paper by A. Lundteigen who was speaking about the faults of cement, including, ". . . where the concrete is to be used under water . . . . . the high-limed, high-grade cements will prove not only inferior but dangerous." He furthermore quotes from the discussion on this paper, remarks by Robert W. Leslie, the dean among cement men in this country: "The obvious result of the tendency toward specifications requiring on the one hand very great fineness and requiring on the other hand very great tensile strength . . . has led producers of cement toward the danger line, so far as ultimate safety of the product is concerned." As these remarks were made in 1897, Mr. Bates reaches the conclusion that we seem to be traveling in circles with little evidence of real advance in knowledge.

In the discussion, the fact was brought out and emphasized strongly that the compactness of the cement paste in concrete is of appreciably greater importance in determining the durability of the concrete, than is the question of increasing the lime con-

tent, say, from 63 to 65%. During the hydration reactions normally taking place in concrete, the former may set free, say, 15% of lime, and the latter may set free perhaps 20%, or one third more. Nevertheless, if the cement is ground to such a size distribution that it produces a very dense paste, the reduction in opportunity for attacking water to get at the cement more than makes up for the small increase in soluble lime.

Cement Admixtures

In a paper on "The Effect of Adding Siliceous Material to Portland Cements," Messrs. Carlson and Troxell report results obtained at the University of California from tests made on a cement prepared by grinding two parts of portland cement with one part of a highly active pozzuolan found in their state. As is to be expected, the water requirement was raised somewhat, but a marked improvement in workability was obtained. The earlier strengths were not so high, but the concretes kept on gaining in strength. The heat generated was reduced, and this, affecting as it does the character of the gel, seems to be desirable for many purposes, especially in hot climates.

In the discussion, the portland cement fundamentalists stood up for their ancient faith, while the rationalists were willing to admit that such a mix might serve a very useful purpose under certain definite conditions.

Measuring Cement Surface Area

Another paper from the Bureau of Standards by L. A. Wagner described the turbidimeter, an apparatus for the measuring of the total surface of portland cement. The sample is suspended in kerosene with the aid of oleic acid and the suspension is placed in a cell with parallel walls. Then a standard light passes through the suspension and actuates a photoelectric cell, the current being read with an ammeter. The light and cell are supported on a movable shelf so that they may be moved up and down to get a measure of the total amount of surface of the cement in the whole suspension. With this apparatus, it is claimed that a determination may be made in 20 minutes. This should prove of very great help in the study of cement. Nevertheless, the relative amounts of the different sizes is of great importance and is often required.

Concrete and Aggregates

In the session devoted to concrete, a report was given on the "Significance of Tests of Concrete and Concrete Aggregates" in which a large number of authorities took part. The mention of names like Talbot, Goldbeck, Richart, Scholer, Pearson, Davis, Walker, Clemmer and Jackson insures the authoritative character of the papers. They give a very satisfactory review of the present status of testing concrete and concrete aggregates which should be of great value to the student or any others seeking information in these fields.

Some experimental studies on paving concrete, carried out by F. H. Jackson and W. F. Kellerman at the U. S. Bureau of Public Roads with the vibratory screed and also the Johnson method developed in Iowa where the concrete is rolled after laying. Both methods were found to be definitely superior to ordinary methods of road laying. With the former, drier, leaner and hence, harsher mixes are handled than with ordinary screeding. Particular attention was paid to voids in the concrete and it was pointed out that void formation was the limiting factor in applying dry mixes.

After concrete has been placed, continued rolling forces excess water out. Then the "dry mix" is applied to the surface. This consists of one part of cement and one part of fine sand spread so that one sack will cover 20 sq. yd. of pavement. After standing awhile, the surface is belted and floated with hand floats at intervals until little moisture was brought to the surface. Sometimes it was also rolled. With this method, the amount of aggregate used may also be increased to advantage. One effect is a reduction in cost and another would be lowering the shrinkage of the concrete. The reviewer respectfully suggests that the use of vibration and "after working," as by the Johnson method, might well be extended to many other applications of portland cement beside roads.

Heat of Cement Setting

The installation of an adiabatic calorimeter for the study of heat of hydration of concrete and of smaller calorimeter for the heat solution of cement, from which the heat of hydration could be calculated and also the amount of hydration, at the University of California was described by S. B. Biddle, Jr., and J. W. Kelley.

Digest of Foreign Literature

By F. O. Anderegg, Ph. D.
Consulting Specialist, Pittsburgh, Pa.

Thermal Decomposition of Calcium Carbonate in an Atmosphere of Carbon Dioxide. K. Bito, K. Aoyama and M. Matsui observed breaks in the heating curves of Icelandspar, indicating decomposition starting at about 907 deg. C., after the CO_2 had been partly driven off and then allowed to recombine. A reprecipitated calcium carbonate started to decompose at 892 deg., but after allowing the CO_2 to recombine again the decomposition temperature dropped to 883 deg. C. With a differential thermometer, the dissociation pressures of mixtures of $CaCO_3$ with freshly ignited CaO were determined and various curves were obtained, depending upon the history of the calcium carbonate. *Journal of the Society of Chemical Industry, Japan.* Supplemental Binding. 1933, V. 36, No. 4, pp. 152-158.

The Effect of Sugar on the Properties of Lime Mortars. Reverberations continue to come in from various parts of the world on this much discussed phenomenon. The latest is a communication from the Chemisches Laboratorium fuer Tonindustrie, Prof. Dr. H. Seger and E. Cramer, Berlin. Lime is about 16 times as soluble in a sugar solution as in water. Tricalcium saccharate is formed which, being only slightly soluble, precipitates so that a rather rapid transformation into this salt occurs. This salt acts as a binder for sand, much as does the carbonate. Working with a lime containing 90% CaO, 2% MgO and 8% soluble SiO_2, in other words, a hydraulic lime, they were able to observe at 7, 28 and 56 days a doubling of the tensile, compressive and flexural strengths on adding 1 per cent sugar. Disk shaped specimens were made up and after standing 28 days in the air were placed in contact with a water column 10 cm. high. The addition of the sugar reduced the amount of water passing in one hour from 20 to 3 cc. To determine the effect of weathering, cubes were exposed on the roof for 9 months and broken in compression, giving 400 and 580 p.s.i. *Tonindustrie Zeitung,* 1933. V. 57, No. 47, pp. 544-545.

Studies on the Calcination of Limestone. As a result of small scale laboratory tests Tokichi Noda and Ei-ichi Ueda found apparently that limestone is calcined about twice as fast at 1,000 deg. C. as at 1,100. It starts to decompose at 925 to 950 deg. The carbon dioxide pressure in the furnace does not seem to have any effect on the *rate* of calcination nor does a small amount of moisture, although the reaction seems to be accelerated somewhat in the presence of considerable amounts of steam.

The addition of common salt of 0.2 to 0.5% during the calcination of the limestone has been a popular practice in Japan for several decades. The presence of the salt seems to smooth out the operation of the calcination. It also lowers the calcination temperature, with a retarding of the reaction. The resulting quick lime is soft and porous. Of various chlorides tried, the potassium salt is most effective with strontium chloride least active. *The Journal of the Society of Chemical Industry, Japan.* Supplemental Binding. 1933, v. 36, No. 4, pp. 137-141.

Synthesis of Calcium Silicates. S. Nagau and K. Murakami mixed one mole of silica with lime ranging from 2.3 to 3 moles and by repeated heating to 1,400 deg. C. and fine grinding, were able to obtain appreciable amounts of tricalcium silicate. *Journal of the Society of Chemical Industry, Japan.* Supplemental Binding, 1933. V. 36, No. 4, pp. 264 to 268.

Cement Products

Rapid Service On Ready-Mixed Concrete

Lime Mortar also a Specialty of Nashville Plant—Products Distributed by a Fleet of Twelve Trucks

By H. M. Fitch

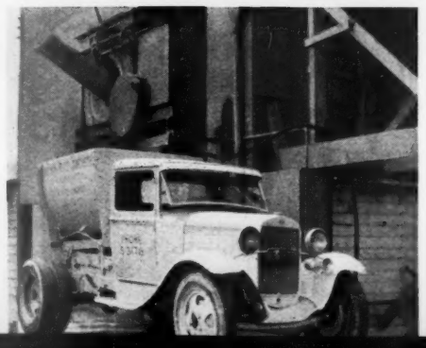
THE plant of the Ready-Mixed Concrete and Supply Co. was erected on the east side of Nashville only three years ago. At that time it was one of the pioneers in the field, and it still is a leader in the district. This company, first known as the Nashville Ready Mixed Concrete and Supply Co., built its plant with the latest equipment and is now a steady and large producer.

The location of the plant, on property adjacent to that of the Cumberland River Sand Co. plant, affords a constant and ready supply of aggregate. This material is carried to the top of the ready-mix plant by a 24-in. Stephens-Adamson conveyor from the stock piling structure of the sand company. This conveyor is supported on a high structural steel trestle and crosses railroad tracks to reach the bins of the ready-mix plant. The belt is driven from the head pulley by a 10-hp. Allis-Chalmers motor.

Provision for Special Mixes

At the top of the plant there is a Blaw-Knox bin divided into six compartments. Two of these hold 75 tons of aggregate each and are used for 1¼-in. gravel and for concrete sand. The other four compartments hold 30 tons each and generally are filled with ¾-in. gravel, concrete sand, mortar, sand and pea gravel. The plant is so designed that one mixer receives its material from the two large compartments and turns out standard mixes while the other mixer may be filled from any of the smaller compartments and is used chiefly for special mixes. Any of the six compartments may be filled from the 24-in. conveyor by means of changeable chutes.

In addition to the aggregate conveyor already mentioned, the bins can be filled from either of a pair of bucket elevators which run up the north side of the plant structure. These elevators were formerly used to deliver all the material to the bins before the sand company completed its plant at the adjacent location, but now are rarely used because the conveyor is much more convenient. They permit, however, the filling of the bins at any time that the regular conveyor cannot be used and also provide a means of delivering special aggregates to the bins. Thus the company occasionally has produced a cinder ready-mixed concrete for special building construction and the cinders were delivered by these elevators.



Handling Bulk Cement

Cement is brought to the plant in bulk either by rail or by truck and delivered to a hopper at the foot of a bucket elevator beside the company's railway siding. The elevator takes the cement up to a large Eric bin for storage. This bin holds three carloads, about 900 bbl. From here it is delivered to the weighing batchers by means of a small screw conveyor driven by a 7½-hp. Westinghouse motor. There is also a bag elevator in the plant to be used when mixes with special cements are specified.

When the plant was first operated, all of the cement was brought in railroad cars and unloaded by hand to the bucket elevator. Recently the company has found it more expedient to use its own agitator trucks to bring the bulk cement to the plant. The trucks are dumped directly to the elevator and some movement of the agitator clears all the cement out so in this way all hard labor is eliminated in handling the cement. The trucks will carry about 25 bbl. to a load.

Mixer Equipment

The plant is equipped with two mixers, one of which delivers concrete to a driveway immediately to the east of the building, while the other dumps to a parallel driveway which passes directly through the plant structure. The automatic weighing hoppers which are on the floor directly above the mixers are fed by gravity from the aggregate bins above. An opening in the floor above the truck driveway permits the operator to stand be-

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Illustrations, top: Plant of Ready Mixed Concrete and Supply Co., Nashville, Tenn. Lime slaking equipment housed in foreground.

Center: Mixer used for special mixes at Nashville plant.

Bottom: Two-yard agitator-type truck used for distribution of company's product.

side his weighing equipment and watch the loading of the truck without leaving his position.

The mixer which receives material from the two large compartments of the aggregate bin and dumps to the outside driveway was manufactured by the T. L. Smith Co. The other is a Koehring mixer and is used largely for special mixes. It receives aggregate from the four smaller bins and dumps to the inside driveway. By using this arrangement, the necessity of resetting one mixer continually is eliminated and large jobs can be supplied with uninterrupted regularity at the same time that special small orders are being turned out. Both mixers are of one yard capacity and each is operated by its own General Electric motor. By using both mixers the plant has a capacity of 500 to 600 tons per day.

Ready-Mixed Lime Mortar

The company started an innovation in the Nashville district by producing a ready-mixed lime mortar. Lump lime from the Jesse Allen Lime Co. plant at Burns is used and the slaking is done at the plant. The lump lime is put in a large vat on the ground floor of the plant and water added. Then it is left one or more days until needed. It is then conveyed to a circular steel agitator tank beside the lime vat where the lumps are completely pulverized. A small centrifugal pump is used to keep the milky lime moving in the tank until it is completely broken up. This pump, which is operated by a 3-hp. General Electric motor, circulates the material out through the outlet pipe at the base of the tank and back again into the tank by a return pipe near its top. A valve in the outlet pipe prevents it going to the mixer until the operator sees that it is completely slaked.

When the lime is ready to go to the mixer, the valve is opened and it is pumped up by the centrifugal pump. The same mixer that is used for special concrete mixes is also used for lime mortar. Some cement and the required amount of sand are then introduced into the mixer and the batch mixed just as if it were concrete. It is delivered to the job by the same trucks used for concrete hauling.

The company has found this a worth-while adjunct to its ready-mixed concrete business. Considerable quantities of the material have already been sent out and the demand seems to be growing. At first hydrated lime was used but lump lime was much less expensive. It is claimed that the constant agitation by the pump completely breaks up all the particles and slakes the lime just as completely as if it were kept in the slaking vat for a couple of weeks.

Truck Fleet

There are 12 trucks in operation at this plant. Ten of these are Mack trucks equipped with 2-yard agitator-type Blaw-Knox bodies. The other two trucks are smaller, having 1-yard dump bodies which are not agitating. These are used principally for small orders at short distances from the plant. One of them is a Mack truck while the other is a Ford. There is a large garage on the property providing ample storage space for this fleet of trucks. All the trucks are painted white and make a striking advertisement for the company.

Beside the garage there is also a well equipped shop for repairs to plant or trucks. One feature of its equipment is a portable welding outfit fitted with wheels from an old automobile to make it possible to move it rapidly to all parts of the plant.

The plant is easily operated by four men. The company emphasizes rapid service and always maintains sufficient force to give its customers the best possible type of service.

A. D. Creighton is president of the company, and C. C. Robertson is vice-president. The plant is operated by W. E. Haswell, who is secretary and treasurer as well as being general manager. Selling is done all over the Nashville area and the company's chief selling points are the quality and variety of the products and the swiftness of the service.

Arch Supports for Mines

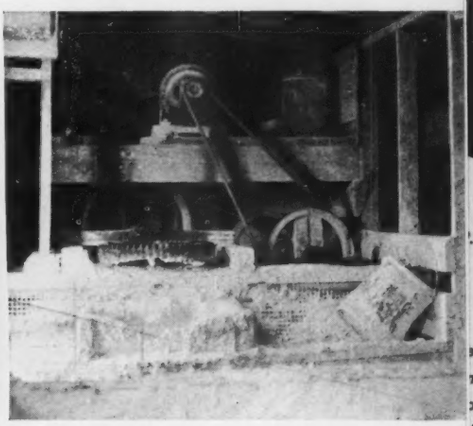
MINES have never been considered by many as a market for concrete products. Now roof supports of a concrete block of special design are being used to some extent in the United States, and have proved highly satisfactory in every respect. A description of this use has appeared in the *Engineering and Mining Journal*. The story was about the workings at the Powderly mine of the Hudson Coal Co., at Carbondale, Penn.

The form of concrete blocks used and the method of setting them is the invention of Hanns Schaefer of Essen, Germany. While the method has been in use in Germany for more than 10 years, it has only been used in America for about three years.

The original cost of this method of support is higher than timbering as commonly practiced, but where the life of the opening to be protected exceeds the life of the original timbering it is more economical than the cost of the initial timbering plus retimbering.

This method consists of an arch built from a prepared footing at each side of the tunnel, using pre-cast concrete units of special shapes in blocks weighing about 75 lb. each. No mortar is used, but at intervals compression members of creosoted yellow pine blocks 2 in. square are introduced.

The shape of the blocks is very much that of a thick "T," the face of the block, or top of the "T," being 18 in. long. In the shank of the "T" a hole is cast, so that when the blocks are in place a continuous hole in the concrete extends around the arch, paralleling the face. Short lengths of wire rope are grouted in this. This rope will hold one of the slabs in place even though the arch becomes deformed to such an extent that the normal keying action is lost. The arch is therefore exceedingly flexible without losing much of its strength. At some points in the Powderly mine deformation is very evident, but no cracking of the concrete blocks, or failure of the arch, has yet been experienced.



Left: One of the Ready Mixed Concrete and Supply Co. trucks ready to receive concrete from the outside mixer at the Nashville plant. Center: Aggregate conveyor at left of main building. Right: Equipment for slaking lime for ready-mixed mortar. Lime vat is in foreground, and agitator tank in a pit beyond with only top showing.

New Machinery and Equipment

New Steam Generator

COMBUSTION ENGINEERING Corp., New York, N. Y., announces the Combustion steam generator, a steam generating unit built in various sizes and said to provide a wide range of capacities at any desired conditions of steam temperature and pressure. Designs have been completed for eight sizes with capacities ranging from 70,000 to 400,000 lb. of steam per hour, from and at 212 deg. F.

It is said this design combines in one unit all the elements required for fuel-burning, steam generation and superheating, heat recovery and ash disposal. It is also said that there are no novel or radical departures from fundamentals, but rather that the design represents a compact and simple arrangement of elements; also that pipes, headers, etc., are located entirely within the casing.

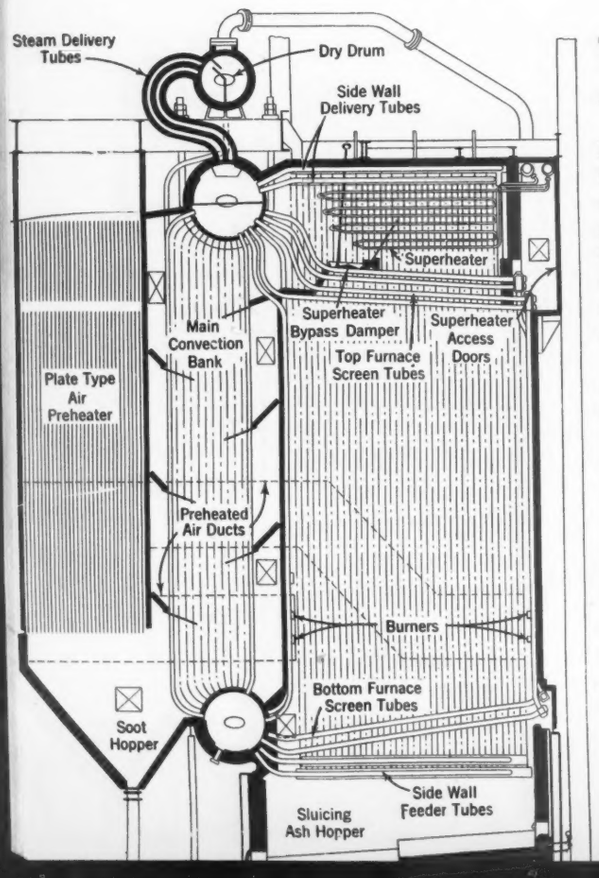
A point of interest is the entire absence of openings through the casing of the generator.

All four walls of the furnace are said to be water-cooled, each wall being composed of a solid row of tubes with only sufficient space between them for construction requirements.

According to the manufacturer the result of this arrangement of wall tubes and circulators is a furnace built completely of water tubes to the exclusion of exposed refractories.

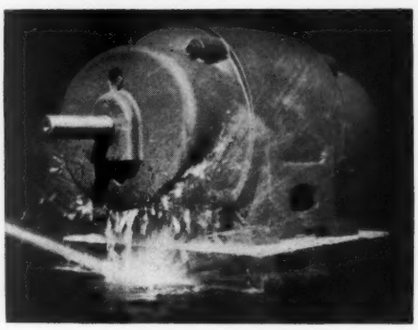
The corner-tangential system of firing is used which is said to produce intense turbulence with extreme rapidity of combustion and correspondingly high temperatures.

Compact generator design



Splash-Proof Motor

A SPLASH-PROOF MOTOR that will prevent entrance of water splashed under pressure from any angle, yet which is ventilated and built in the same dimensions as standard open motors, is announced by the Louis Allis Co., Milwaukee, Wis.



Special motor housing

The motor is designed for locations where motors are subject to splashing and dripping liquids, such as are sometimes found in sand and gravel plants.

Redesigned Scales

THE Kron Co., Bridgeport, Conn., announces its entire line of automatic dial scales has been redesigned.

The design of the indicating mechanism has been changed and simplified. The number of bearings in the mechanism has been reduced to eight, six of which are high-grade ball bearings, specially designed for the scale. The sector and pinion design is such that no variation is possible in the mesh of the gearing, which makes for constant accuracy, it is claimed.

A further development is a device for absorbing vibration in the installation which might be transmitted to the scale pointer.

The dial head is completely sealed to prevent entrance of dust and moisture. The dial head is also arranged to swivel 360 deg.

Speed Reducer

THE ALLIS-Chambers Manufacturing Co., Milwaukee, Wis., announces the development of a motor reduction unit for use where low speed drives are required. A standard round frame type motor is mounted directly on the gear reducer housing thus forming a compact unit. Helical gears are used to permit high efficiency and quiet operation.

Standard speeds at the power take-off are from 3.02 r.p.m. to 380 r.p.m., but lower speeds can be provided. With the use of a 1750 r.p.m. motor 6.08 r.p.m. is obtained.

The bearings supporting the gear drives are ball or roller type. Lubrication is automatic and continuous. Standard units are arranged for floor mounting. Units can be supplied for wall, ceiling or vertical mounting. Any desired type of motor may be supplied.

New Recording Instrument

A NEW device which gives an accurate and continuous record of machine tool operation would seem to be applicable to at least some operations in the rock products industry. The instrument, called the Chronolog, was developed by the National Acme Co., Cleveland, Ohio, and is distributed by the Graybar Electric Co., Inc.

It is said to be applicable to any operation which is subject to interruption and it gives both a visual indication, for the operator's information, and a printed record, of the time, total idle time, total productive time, total units produced, and the causes of idle time. This is done automatically by adding them up on counters and printing them on a chart at fixed intervals.

Automatic checking device

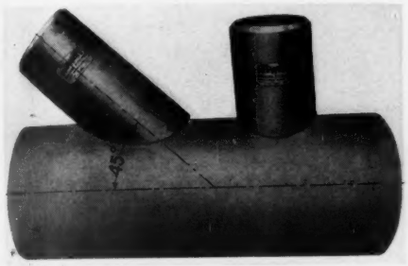
The chart record is removed daily and the causes of idle time are quickly and easily summarized from it. The record as shown on the counters may also be printed on a card at any time for use by any department. A red signal light is used to call attention to interruptions.

The device may be mounted either on the machine or within reach of the operator and

is operated from an ordinary lighting circuit. It gives a printed record of actual facts rather than opinions and is said to have in every case materially increased production by calling attention to the causes and extent of avoidable interruptions. The cost of the instrument is stated to be nominal.

Shaped Welding Nipples

THE Midwest Piping and Supply Co., St. Louis, Mo., announces a line of shaped welding nipples which eliminate templates when saddling one pipe upon another. The nipple is placed in position before the opening is cut in the pipe upon which it is



To eliminate templates

to be saddled; the correct opening is then traced from the nipple contact line.

These shaped nipples, both 90 and 45 deg., are made from standard weight and extra heavy wrought steel pipe and genuine wrought iron pipe.

Scrubbing and Cleaning Equipment

A NEW DEVELOPMENT in scrubbers is announced by the Niagara Roller Bearing Screen Co., Buffalo, N. Y. It is a trough or tube type, the trough being actuated by an eccentric shaft which gives it a circular or gyratory motion. This motion, acting in one direction, turns or whirls the material in the opposite direction causing it to surge and cascade in a spiral path.

This machine grades as it scrubs and has no moving parts in the actual scrubbing tube. A 50 ton unit requires between 5½ and 7 hp., and units may be made with multiple tubes to obtain any desired capacity up to 1000 tons per hour.

A second machine, the Niagara Centrifugal sand scrubber and soft stone breaker, accomplishes its scrubbing action by centrifugal force. This machine consists of a series of horizontal revolving discs provided with scrubbing sections and return baffles to give the material a number of similar treatments before it is discharged from the machine. The number of discs used depends on the amount of treatment required. By regulation of the water used in the process regulation of severity of action can be made. The more water used the less will the stone be broken in cleaning. It is especially suited to the production of clean stone sand. The water requirement is also low.

Blast Hole Driller

DESIGNED for blast hole drilling in limestone and sandstone, a new all-steel drilling unit is announced by the Keystone Driller Co., Beaver Falls, Pa. Mechanical features of its construction are dual spring shock absorbers, full crawler mounting, and chain drive throughout. Power is furnished by a 20 hp. gasoline engine of a 15 hp. motor.

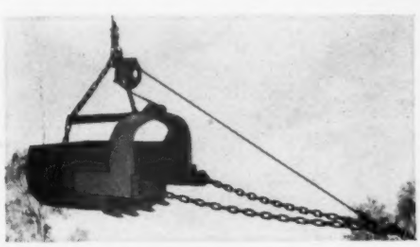
Weight of this machine is 14,000 lb., and it has been designed for the compactness, strength and operative economy essential for modern quarry and mine work. One of these machines is reported to be drilling trap rock in an eastern quarry, comparing favorably in performance with other machines.

This unit may be used for drilling holes of the usual range in size, but the manufacturers urge the 6-in. hole as correct for maximum economy.

Light Dragline Buckets

DRAGLINE BUCKETS for digging light soils are announced by the Page Engineering Co., Chicago, Ill. Light weight, strength and simplicity are said to be the chief characteristics of these buckets.

The buckets use both electric arc welding and riveting in their construction. Joints in the bucket proper are apron welded with seams ground down smooth. Arch and bump plates are both welded and hot riveted. The lip is of forged steel and heat treated, cut-



New light buckets

ting edge is machined and plate connections are recessed to eliminate overlaps. Teeth are of new design, fastening to the lip in a manner to prevent working loose or becoming wobbly. Lip construction is such that the bucket may be used with or without teeth.

The hitch plate construction enables any desired pitch of the bucket to be obtained, the manufacturer states, without making it necessary to increase the length of the bucket jaw. The dump block embodies a sheave which is claimed to increase leverage on dumping cable. Other features claimed are one-piece loading cluster, wear-resisting chains and bulbed missing links and fittings.

Horizontal Steam Pumps

AN IMPROVED LINE of horizontal duplex steam pumps, especially designed and fitted for handling either water or chemical solutions, has been announced by the Worthington Pump and Machinery Corp.,

All-steel drilling unit in action

Harrison, N. J. Built in three different types—valve plate, turret and pot valve—these units are said to incorporate many features which represent great forward steps in steam pump construction. Foremost among these features is the adoption of stainless steel drop-forged valve service on all models. Other features are: Valve plate type pumps have the discharge valves screwed into a common removable deck; for transfer, tank, circulating, boiler feed and water supply service, units of this group are standard fitted and have forced-in liners and screwed stuffing boxes; and turret type pumps have the suction and discharge valve decks cast integral with the cylinders, are of the submerged piston design, and have disc type valve service.

Conveyor Belt

ANNOUNCEMENT of a new conveyor belt is made by the Manhattan Rubber Manufacturing Division of the Raybestos-Manhatten, Inc., Passaic, N. J. Features claimed for this new belt are greater flexibility, lack of strength, and puncture-proof qualities.

A specially woven duck is used in the carcass of the belt, and improvement is claimed in bonding of the interlaced members. The bonding compound and the method of impregnating the belt with it are both new developments with the company, and are important in providing certain of the improved features, it is claimed.

THE INDUSTRY

New Incorporations

Ideal Sand Co., Sandy, Utah, filed articles of incorporation. Capitalization, $25,000. Ralph E. Bristol is president and general manager and Florence Day Bristol is secretary-treasurer.

Consolidated Rock Asphalt Co., Louisville, Ky. Capital stock, $50,000. Incorporators are A. Jakoby and L. C. Harrison.

Limestone Rock Asphalt Co., Austin, Tex. Capital stock, $500. Incorporators, Herman Brown, George R. Brown and D. G. Young.

Empire Sand and Gravel Corp., New York, N. Y. Capitalization, $10,000. The incorporators are William W. Tracy, Bessie F. Stasny and Vincent Gonzales, Jr.

Saint Catherine Gravel Co., Natchez, Miss. Capital stock, $5,000.

Diamond Spring Sand and Gravel Co., Lake, Wis. 500 shares no par value. Incorporators are Anton and Catherine Grabske and J. V. Schmitz. J. O. Roehl, attorney, First Wisconsin National Bank Bldg., Milwaukee, Wis.

Bernard G. Antun Sand and Gravel Corp., Floral Park, N. Y. Incorporators are Bernard G. Antun, Jericho Turnpike, Anna Antun and Theresa Helmig.

Essex Sand and Gravel Co., Peabody, Mass. 1,000 shares common no par value. Edmund J. Lonergan is president and Richard A. Snyder is treasurer.

Durable Rock Asphalt Co., Inc., Leitchfield, Ky., is capitalized at $50,000. Incorporators are E. V. Browns, B. B. Ochs and O. H. Hershman.

General Concrete Co., Dallas, Tex. Capital stock, $5,000. Incorporators are Carl Short, A. S. Field and W. D. Brookover.

Saginaw Lime Works, Inc., Wilmington, Del. To deal in lime, limestone, marble, granite, etc. C. S. Peabbles, L. E. Gray and L. H. Herman are the incorporators.

Vang Ready Mixed Concrete Co., Wilmington, Del. To deal in concrete, concrete aggregates and builders' supplies. 5,000 shares no par value.

Charles Birchy and Sons Co., East Point, Ga., to deal in the marketing and selling of sound-absorbing stone, tile and plaster for walls and ceilings and other acoustical products. Capital stock, $50,000.

Central Florida Superior Sand Co., Inc., Ocala, Fla. J. J. Taylor and D. White.

Sand and Gravel

Star Sand Co., Portland, Ore., has requested authorization to decrease its capital stock from $500,000 to $100,000.

Kelly and Sullivan Construction Co. plant at Westfir, Ore., has been sold to the Alaska Junk Co., Portland, high bidder in a recent tax sale.

American Sand and Material Co. has had Michael J. Hart appointed as its receiver by a circuit court order in Missouri.

Dayton Sand and Gravel Co., operating a gravel digger and barge on the Willamette river near Statesman, Ore., reports damage to the vessel when high water forced it against a bridge pier.

Monticello Gravel Co., operated by Martin McMurry and Luther Bearden, is employing 20 men in its gravel pit near Monticello.

Knoxville Sangravl Material Co., Knoxville, Tenn., is working its plant to capacity and stocking its yards with sand and gravel before the low water period sets in.

Marion Gravel Co., Inc., Marion, Ind., announces the transfer of its offices to property east of the I. O. O. F. cemetery.

Bristol Sand and Gravel Co., Bristol, Penn., is object of an involuntary petition of bankruptcy brought by three creditors.

Hardy Sand Co., Evansville, Ind., announce the location of a sand mixing and milling plant west of Camden, Tenn.

Independent Sand and Gravel Co., Portland, Ore., has filed a petition of voluntary bankruptcy.

Quarries

Dubuque Stone Products Co., Dubuque, Ia., announces the transfer of executive offices to the quarry and crushing plant at Eagle Point. The fuel department of the company now is separate from the materials division.

New Castle Lime and Stone Co., New Castle, Penn., has purchased new limestone crushing equipment and begun operation at its Kittanning plant.

A. T. and C. Stone Co., west of Orleans, Ind., is employing 120 men on two shifts of 10 hours each to supply the demand for its product on road contracts.

Garrett Construction Co. is working two shifts of men in its crushed limestone quarry near Springfield, Mo.

Logansport Stone and Lime Co., Huntington, Ind., has filed articles of final dissolution at Indianapolis.

Cement

Metropolitan Cement Corp., New York, N. Y., affiliate of the Edison Cement Co., asks for bids for a two-story mill addition at their plant in Raritan township, N. J.

Portland Cement Co., Inkom, Ida., will continue to run its plant this summer, employing 40 men.

Ash Grove Lime and Portland Cement Co., Kansas City, Mo., has recalled 100 men to its employ for regular operation at least until September 1.

Marquette Cement Manufacturing Co. has recalled 250 men to work in its plant at Cape Girardeau, Mo.

Northwestern States Portland Cement Co., Mason City, Ia., has resumed regular operations with 200 men.

Aetna Portland Cement Co., Detroit, Mich., has recalled workers for regular operation in its plant at Fenton.

Universal Atlas Cement Co., Chicago, Ill., has resumed operation at three of its plants this month.

Among other reopened plants are those of the Olympic Portland Cement Co., Bellingham, Wash., and the Manitowoc Portland Cement Co., Manitowoc, Wis.

Peerless Cement Corp., Detroit, Mich., has placed another large rotary kiln in operation. May shipments were 32% greater this year than in May, 1932.

Montreal, Que. Canada Cement Co. has reopened its Hull plant, employing 100 men with modernized equipment.

Medusa Cement Co., Cleveland, O., has placed four kilns in operation at its plant in Dixon, Ill.

Silica

Haymon Krupp and Co., El Paso, Tex., announces production of the diatomaceous earth "Cel-O-Lite." A special filtration process has been worked out by this company.

American Smelting and Refining Co., New York, N. Y., has purchased the Grand Central property in the Tintic district of Utah from the Chief Consolidated Mining Co. for $300,000 plus royalties. The Grand Central mine is said to contain from 600,000 to 1,000,000 tons of low-grade siliceous ores.

Personals

M. D. McIntosh, superintendent of the Northwest Magnesite Co. quarry at Chewelah, Wash., for the past 15 years, has retired and will make his home in Tacoma.

Joseph A. Kempster, general superintendent of the Universal Atlas Cement Co., Hammond, Ind., again has been elected president of the East Chicago Community Chest Association.

J. C. Pearson, director of research for the Lehigh Portland Cement Co., Allentown, Pa., has been elected to membership on the executive committee of the American Society for Testing Materials.

M. I. MacTaggart and **E. Schroder** of the Kandos Cement Co., Ltd., Kandos, N. S. W., Australia, are completing an extended trip through the United States. Among their stopover points was Chicago, where they visited several cement plants and A Century of Progress Exposition.

Sewell L. Avery, president, U. S. Gypsum Co., has succeeded George M. Reynolds as a director of Pullman, Inc.

H. S. Sparks has been appointed superintendent of the El Paso, Tex., plant of the Southwestern Portland Cement Co.

Mark E. Smith, formerly secretary-treasurer of the Kelly Sand and Material Co., Burlington, Ia., has been appointed manager.

Henry W. Graupner, for the last 10 years special representative in Arkansas for the Marquette Cement Manufacturing Co., has been promoted to the position of southern sales manager. His headquarters will be at Memphis, Tenn.

Obituaries

The late W. D. Lober

William Diehl Lober, president of the Vulcanite Portland Cement Co., died June 19 at Philadelphia, Penn. Mr. Lober was one of the original members of the Portland Cement Association. In 1902 Mr. Lober was made secretary of the company and in 1924, upon the death of his father, he assumed the presidency of the concern.

Stanley Overall, part owner of the Tennessee Cement and Lime Co., Summitville, Tenn., died at Murfreesboro, from paralysis.

H. E. Nichols, 46, superintendent of the Southwestern Portland Cement plant at El Paso, Tex., died following an illness of six weeks. He had been in charge of the plant since 1925.

Theodore G. Dickinson, 77, president of the Marquette Cement Co., died July 2 of heart disease at his estate in Libertyville, Ill. He founded the Marquette Cement Manufacturing Co. more than 30 years ago and was president from the beginning. Mr. Dickinson lived in or near Chicago for 50 years.

Orrin W. Robertson, president of the Western Lime and Cement Co., died in his 84th year at Milwaukee, Wis. His connection with the company extended over a period of 50 years.

Manufacturers

McVoy-Hausman Co., Brimingham, Ala., sales agency, is announced as a partnership of James L. McVoy and F. A. Hausman, former manager of Hausman-Harwick Machine Tool Co. This firm now represents the Cross Engineering Co., Carbondale, Pa., and several other concerns in the Brimingham territory.

Chain Belt Co., Milwaukee, Wis., is filling an order for 10 carloads of concrete mixing machinery to be shipped to the Kaiser Paving Co., contracting firm in charge of the San Francisco-Oakland bridge construction. This is said to be the largest single order placed since the building of the Panama Canal.

Neff and Fry Co., Camden, Ohio, announce completion of plant improvement and engineering methods in connection with the manufacture and erection of storage bins. Portability plus all the strength and stability of the stationary unit is claimed for the modern Neff and Fry bins. Method of construction is said to allow for a water-cement ratio in the concrete unit which oftentimes produces a crushing test strength of approximately 7,000 lbs. per square inch. Hydraulic pressure developed by the machines produces a pressure of over 150 tons on the concrete.

Farrel-Birmingham Co., Ansonia, Conn., put a 10% wage increase into effect July 10. A basic 40-hour week also was established.

Trade Literature

Shovels. Detailed specifications, working range diagrams and illustrations of the new Model 42, standard ¾-yd., full revolving convertible shovel are contained in catalogue 42-A. BAY CITY SHOVELS, INC., Bay City, Mich.

Vibrating Screens. Bulletin 1475 technically describes and illustrates Style B, Allis-Chalmers centrifugal vibrating screens used for sizing crushed stone, gravel, slag, etc. Applicable on wet or dry process. ALLIS-CHALMERS MANUFACTURING CO., Milwaukee, Wis.

Chain Drive. Souvenir booklet of A Century of Progress, traces development of the detachable chain drive link invented 60 years ago. LINK BELT CO., Chicago, Ill.

Materials Handling Equipment. Separate catalogues and descriptive matter on electric lift trucks, hydraulic trucks, skid platforms, etc., are combined to make complete technical presentation. YALE AND TOWNE MANUFACTURING CO., Philadelphia, Pa.

NORTHWEST ADVANTAGES reduce PIT LOADING COSTS

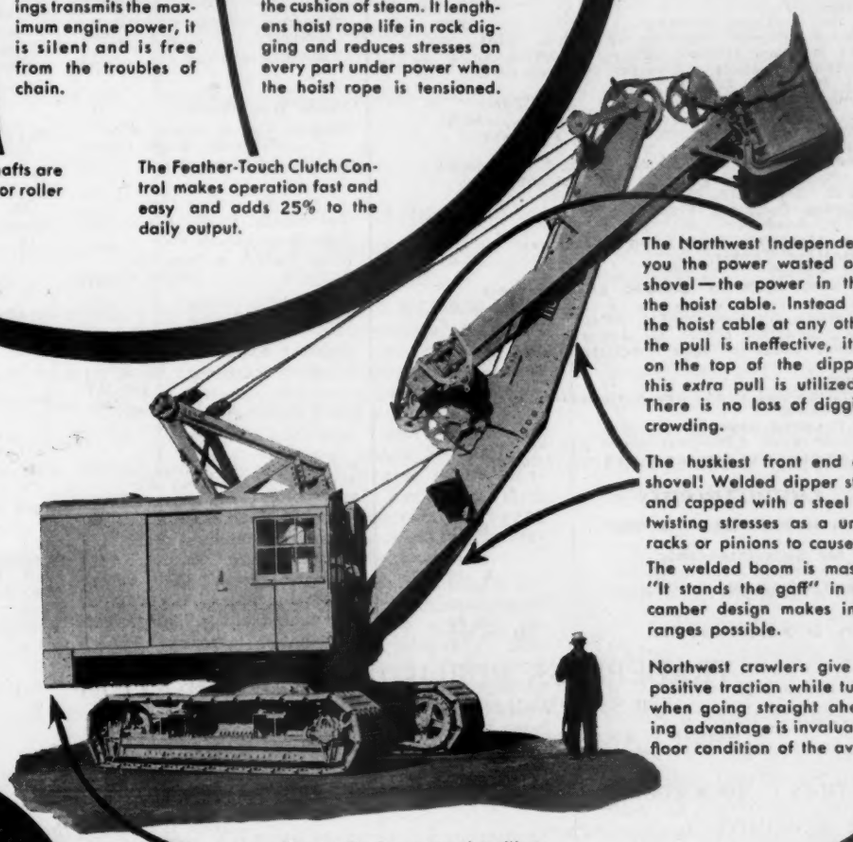
The Heavy Duty, Slow-Speed Power Plant hangs on in hard going.

The Helical Gear Drive running in oil and mounted on ball bearings transmits the maximum engine power, it is silent and is free from the troubles of chain.

The Cushion Clutch permits the Northwest shovel to retain its great power and gives it the cushion of steam. It lengthens hoist rope life in rock digging and reduces stresses on every part under power when the hoist rope is tensioned.

All high speed shafts are mounted on ball or roller bearings.

The Feather-Touch Clutch Control makes operation fast and easy and adds 25% to the daily output.



The Northwest Independent Crowd saves you the power wasted on the ordinary shovel—the power in the dead-end of the hoist cable. Instead of dead-ending the hoist cable at any other point where the pull is ineffective, it is dead-ended on the top of the dipper sticks where this *extra* pull is utilized for crowding. There is no loss of digging power while crowding.

The huskiest front end on any 2 Cu. Yd. shovel! Welded dipper sticks, wide spread and capped with a steel cap casting resist twisting stresses as a unit. There are no racks or pinions to cause trouble.

The welded boom is massive in structure—"It stands the gaff" in quarry work! The camber design makes increased operating ranges possible.

Northwest crawlers give your operator positive traction while turning as well as when going straight ahead. This steering advantage is invaluable in the rocky floor condition of the average pit.

Short tailswing makes handling easy in cramped quarters or box-end cuts.

2 CU. YD. SHOVEL

NORTHWEST

NORTHWEST ENGINEERING CO.

The world's largest exclusive builders of gasoline, oil burning and electric powered shovels, cranes and draglines.

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Chicago, Ill., U. S. A.

NORTHWEST ENGINEERING CO.
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Chicago

Gentlemen:

I will be glad to accept your offer survey and recommend improvem in regard to our shovels and pit op tion. This, of course, is without obli tion on our part.

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Address .....

Town .....

Company Name ..... State .....

RP 8-25-Gray

Recognized the World Over as the Leader in Its Field

Rock Products

With which is Incorporated **CEMENT and ENGINEERING NEWS** Founded 1896

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August 25, 1933

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